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ABSTRACT

The major goal of the Comprehensive Instructional Management System for mathematics is to provide the classroom teacher in New York City with a well-structured, objective-based curriculum. This second part of the manual for Level 3 includes modules for 14 topics: (1) numbers and numeration; (2) addition of whole numbers; (3) subtraction of whole numbers; (4) multiplication of whole numbers; (5) division of whole numbers; (6) fractions; (7) decimals; (8) integers; (9) geometry; (10) measurement; (11) algebraic concepts; (12) graphs, probability and statistics; (13) problem solving; and (14) review. The recommended instructional sequence is listed, followed by the content listed by topic. Reinforcement of previously learned skills is incorporated. Each objective is considered, with vocabulary, activities for getting started, and teaching strategies to use. The pupil's worksheets are interspersed. Resource materials, symbols, and equipment lists are included. (MNS)

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CIMS

COMPREHENSIVE INSTRUCTIONAL MANAGEMENT SYSTEM

A Cyclical Mathematics Curriculum

PART 2 — TEACHER

NEW YORK CITY BOARD OF EDUCATION
OFFICE OF CURRICULUM DEVELOPMENT AND SUPPORT
DIVISION OF CURRICULUM & INSTRUCTION

ISBN No. 88315-520-6

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FOREWORD

The Comprehensive Instructional Management System (CIMS) is a unified mathematics curriculum for grades K-7. The curriculum is cyclical in design, and reflects the most recent New York City and New York State guidelines.

Utilizing the experience of our system's teachers, we have developed a teacher-designed curriculum that includes a rich selection of classroom-tested successful mathematics activities. The major goal of the CIMS mathematics project is to provide the classroom teacher with a well-structured, objective-based curriculum. All objectives are supported by a variety of strategies. Student mastery of these objectives is readily diagnosed through the system's testing component.

The curriculum format is structured to allow the teacher to determine the ability level of the students in the topic under study, and to permit the students to move forward at their individual rates. Each module of instruction provides the teacher with a set of related performance objectives. These objectives are supported by activities which probe and develop the students' readiness to undertake new skills and concepts. Further reinforcement is given to mastery of the objectives through accompanying student workbooks.

It is hoped that this curriculum will not only assist teachers in developing vital mathematics instruction, but will serve to expand and enrich students' mathematics skills.

Charlotte Frank

Charlotte Frank,
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ACKNOWLEDGMENTS - 1986

The Comprehensive Instructional Management System (CIMS) was developed as a project of the Division of Curriculum and Instruction, Mrs. Charlotte Frank, Executive Director. Mr. Bernard Mecklowitz, Community School Superintendent CSD 1; Dr. Peter Negroni, Community School Superintendent CSD 12; Dr. Harvey Garner, Community School Superintendent CSD 18; Mr. Carlos Edwards, Community School Superintendent CSD 23, and Mr. Joseph Pacheco, Community School Superintendent CSD 32 supervised the overall development of the CIMS program within their respective districts.

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INTRODUCTION

The Comprehensive Instructional Management System (CIMS) is a teacher-designed educational delivery system composed of a curriculum, a testing component and a computer managed reporting system.

Designed to support mathematics instruction in the classroom, CIMS provides a comprehensive cyclical mathematics curriculum for grades K through 7. Each manual describes the curriculum for a single level or grade. Teacher curriculum developers from elementary, intermediate and senior high schools utilized the most current New York City and New York State guidelines in formulating the curriculum's modules and sequence.

Curriculum Topics

The CIMS mathematics curriculum has been organized into the following 14 topics:

.01	Numbers and Numeration
.02	Addition of Whole Numbers
.03	Subtraction of Whole Numbers
.04	Multiplication of Whole Numbers
.05	Division of Whole numbers
.06	Fractions
.07	Decimals
.08	Integers
.09	Geometry
.10	Measurement
.11	Algebraic Concepts
.12	Graphs, Probability, Statistics
.13	Problem Solving
.14	Review

Modules of Instruction

The CIMS curriculum is organized into modules or groupings of similar skills or understandings. Each module has a suggested period of duration for student mastery, a listing of new skills to be mastered by the student in the form of performance objectives, a section devoted to vocabulary, terms and symbols, getting started activities which serve as prerequisite skills in preparation for undertaking new objectives, strategies for teaching the new skills and student activities for providing reinforcement for the newly learned objective. Note that the lesson duration is included only as a guideline to the teacher for planning purposes. The actual time required for each module will vary from class to class and from child to child depending on the needs of the students and the teacher's judgment.

Priorities of Performance Objectives

There is an order of priority to be recognized in teaching the content presented in the CIMS NEW YORK CITY MATHEMATICS CURRICULUM. Performance objectives with the greatest priority are so basic that unless the student acquires a satisfactory degree of competency in them, the student cannot progress. Such topics are marked A and mastery by all pupils is essential.

Performance objectives marked B are required to be presented to all students. Mastery is not expected at this time. These objectives will be developed further and reinforced later.

Performance objectives marked C are of special interest. These should be taught to increase positive attitudes towards mathematics.

Summary: A - Mastery of this objective is essential for progress. Opportunities for reinforcement should be provided throughout the school year.
B - These objectives are to be taught to all pupils. Mastery is not essential at this time because the topics will be further developed and reinforced.
C - Objectives of special interest.

Topic Tab Key

01. Numbers and Numeration

02. Addition of Whole Numbers

03. Subtraction of Whole Numbers

04. Multiplication of Whole Numbers

05. Division of Whole Numbers

06. Fractions

07. Decimals

08. Integers

09. Geometry

10. Measurement

11. Algebraic Concepts

12. Graphs, Probability, Statistics

13. Problem Solving

14. Review

Module Coding Key

3.06.01.03 A

Grade level
(Grade 3)

Topic number
(.06 Fractions)

Module ranking within topic and level
(Fractions: Equivalent Fractions)

Performance objective within this module
(The student will be able to
compare and order like fractions.)

Priority
(See page xvi)

INSTRUCTIONAL SEQUENCE DESCRIPTION

An instructional sequence is given in list form on the following pages for this level. The sequence has been arranged to reflect what is considered the most effective presentation of the mathematics curriculum. Each module in the list is described by its unit number, module number, title, and page location.

The CIMS tests are integrated within the manual sequence. The test number is located in the first column. Each test is designed to assess priority objectives from the preceding modules. The tests are used to determine student mastery of specific performance objectives within these modules and appear in a multiple choice format. Each performance objective code number preceded by an * indicates that the performance objective is not tested on a CIMS cumulative test.

REVISED
INSTRUCTIONAL SEQUENCE - LEVEL 3

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
	1	3.10.01	Days and dates on a calendar	1
	2	3.14.01	Basic addition and subtraction facts	3
	3	3.12.01	Bar graphs	4
	4	3.10.02	Measurement - time	5
	5	3.14.02	Place value and expanded notation through 999	7
	6	3.01.01	Count by tens and hundreds through 1000	8
3.01	7	3.01.02	Round 3-digit numbers to the nearest ten/hundred	9
	8	3.01.03	Place value through 9,999	11
	9	3.01.04	Order numbers through 9,999	12
	10	3.13.01	Guess and check	13
	11	3.10.03	Temperature - Fahrenheit and Celsius thermometers	14
3.02	12	3.04.01	Multiplication facts	15
	13	3.05.01	Concepts of division	16
	14	3.04.02	The identity element (1) for multiplication and the role of zero	18
	15	3.06.01	Equivalent fractions	19
	16	3.10.04	Weight in customary units	21
3.03	17	3.11.01	Open sentences	22
	18	3.01.05	Even and odd numbers	23
	19	3.02.01	Commutative and associative properties of addition through 999	24
	20	3.02.02	Addition of 3-digit numbers without regrouping (exchange)	25
	21	3.03.01	Subtraction of 3-digit numbers without regrouping (exchange)	26
3.04	22	3.02.03	Addition of 3-digit numbers with one regrouping (exchange) ones to tens	27

REVISED
INSTRUCTIONAL SEQUENCE - LEVEL 3

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
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REVISED
INSTRUCTIONAL SEQUENCE - LEVEL 3

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
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Unit 38

3.04.05 MULTIPLICATION OF THREES AND FOURS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.04.05.01A multiply three (3) by the numbers one (1) through nine (9), using vertical and horizontal formats;

e.g.,

$$\begin{array}{r} 3 \\ \underline{x1} \\ 3 \end{array} \qquad \begin{array}{r} 3 \\ \underline{x2} \\ 6 \end{array} \qquad \begin{array}{r} 3 \\ \underline{x3} \\ 9 \end{array}$$

1 x 3 = 3
2 x 3 = 6
3 x 3 = 9

3.04.05.02A multiply four (4) by the numbers one (1) through nine (9), using vertical and horizontal formats;

e.g.,

$$\begin{array}{r} 4 \\ \underline{x1} \\ 4 \end{array} \qquad \begin{array}{r} 4 \\ \underline{x2} \\ 8 \end{array} \qquad \begin{array}{r} 4 \\ \underline{x3} \\ 12 \end{array}$$

1 x 4 = 4
2 x 4 = 8
3 x 4 = 12

*3.04.05.03A apply the commutative property of multiplication to the 3 and 4 times tables;

e.g.,

3 x 6 = 18
6 x 3 = 18
3 x 6 = 6 x 3

2 x 4 = 8
4 x 2 = 8
2 x 4 = 4 x 2

*3.04.05.04A solve word problems related to skills learned in this module.

e.g.,

> If 6 girls each buy 3 apples, how many apples will they buy in all?

3.04.05

VOCABULARY

TERMS	**SYMBOLS**
multiply	x
vertical	
horizontal	
commutative property	
array	

GETTING STARTED 1:

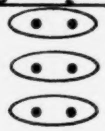
Display the following arrays:

3 groups of 2	3 groups of 3	3 groups of 5
• •	• • •	• • • • •
• •	• • •	• • • • •
• •	• • •	• • • • •

Say, "An array is an arrangement of dots in rows and columns. Look at the first array. Can we use multiplication to write a number sentence for this array? Explain." (A multiplication number sentence for this array is 3 x 2 = 6. There are 3 rows and 2 columns of dots in the first array.) Ask a student to ring each group of 2 in the array. Ask another student to write 3 x 2 = 6 in horizontal and vertical formats.

e.g.,

3 groups of 2



3 x 2 = 6

$$\begin{array}{r} 2 \\ \underline{x3} \\ 6 \end{array}$$

Repeat this procedure for the other arrays displayed.

GETTING STARTED 2:

Write several statements on the chalkboard. Some of these statements will refer to multiplication while others will not.
e.g.,

1. This is a form of repeated addition.
2. This is a form of repeated subtraction.
3. An odd number plus an odd number equals an even number.
4. The operation is commutative.
5. A number line is helpful for learning these facts.
6. Arrays are helpful for learning these facts.
7. These number sentences may be written in horizontal or in vertical format.
8. The answer is called the sum.
9. The answer is called the product.
10. If a factor is zero, the product is zero.

Say, "Some of the statements written on the chalkboard tell us something about multiplication. Some do not. Read all the statements. On a paper, write the numbers of the statements which tell us something about multiplication." After the students have read the statements and written the numbers, ask each student to read a statement he/she has chosen and to explain why it refers to multiplication.

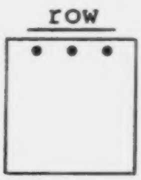
Note: Statements 1, 4, 5, 6, 9 and 10 refer to multiplication. Statement 2 refers to division. Statements 3 and 8 refer to addition.

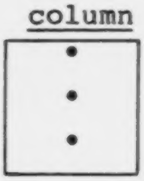
3.04.05

3.04.05.01 **multiply three (3) by the numbers one (1) through nine (9), using vertical and horizontal formats**

STRATEGY 1: Prepare and distribute a placemat and 27 discs to each student or group of students. Ask the students to display a row of 3 discs. Then ask the students to display a column of 3 discs. Say, "What is the difference between a row and a column?" (A row is horizontal. A column is vertical.)

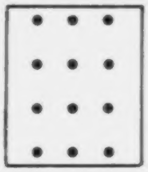
e.g.,





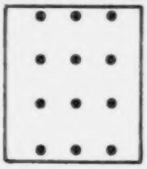
Say, "Remove the column of discs but leave the row of discs displayed on your placemat. Beneath this make another row of 3 discs." Repeat this procedure until four rows of 3 discs are displayed.

e.g.,



Say, "How many groups of 3 does this array show? (This array shows 4 groups of 3.) Copy this array into your notebooks. Write a horizontal and a vertical multiplication example which represents 4 groups of 3." Ask several students to write this at the chalkboard.

e.g.,


4 groups of 3

4 x 3 = 12

$$\begin{array}{r} 3 \\ \underline{\text{x}4} \\ 12 \end{array}$$

Say, "How could this array have been represented with an addition example? (3 + 3 + 3 + 3 = 12) Why do

STRATEGY 1: cont'd

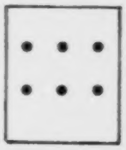
we use multiplication?" (Multiplication is a fast way to add the same addends many times.)

Repeat this procedure through 9 groups of 3.

Reverse this procedure by asking the students to use their discs to make an array representing a given number sentence.

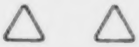
e.g.,

2 x 3 = 6



STRATEGY 2: Prepare and distribute 27 ice cream sticks to each student or group of students. Say, "We will use sticks to make triangles. How many sides does a triangle have? (A triangle has 3 sides.) Use the sticks to make a triangle. What multiplication facts represent 1 triangle made of 3 sticks?" (1 x 3 = 3 and $\begin{array}{r}3\\ \times 1\\ \hline 3\end{array}$.) Repeat this procedure for 2 triangles. Draw a chart on the chalkboard and ask the students to complete it.

e.g.,

Number of Triangles	Number of Sticks	Multiplication Facts	
1 triangle 	3 sticks	1 x 3 = 3	$\begin{array}{r}3\\ \times 1\\ \hline 3\end{array}$
2 triangles 	6 sticks	2 x 3 = 6	$\begin{array}{r}3\\ \times 2\\ \hline 6\end{array}$

Repeat this procedure through 9 triangles.

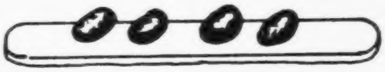
Say, "How could this be explained by using addition?" (By using addition 9 triangles could be represented by 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 = 27.) Ask a student to write the addition algorithm on the chalkboard. Say, "Why do we use multiplication rather than addition?" (Multiplication is a fast way to add the same addend many times.)

3.04.05

3.04.05.02 **multiply four (4) by the numbers one (1) through nine (9), using vertical and horizontal formats**

STRATEGY 1: Prepare and distribute 9 ice cream sticks, glue, and approximately 50 beans to each student or group of students. Display a stick with 4 beans glued onto it.

e.g.,



Ask the students to use their beans, sticks, and glue to make several beansticks, each with 4 beans.

Display 2 beansticks. Say, "How many beans are on each stick? (There are 4 beans on each stick.) How many sticks with groups of 4 beans are shown? (There are 2 sticks with 4 beans on each stick.) How many beans are there in all?" (There are 8 beans in all.) On the chalkboard write the following:

2 sticks x 4 beans on each stick = 8 beans

Ask a student to write a horizontal multiplication number sentence representing 2 groups of four = 8 and ask another student to write a vertical algorithm representing 2 groups of four = 8.

e.g.,

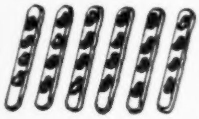
$2 \times 4 = 8$

$$\begin{array}{r} 4 \\ \times 2 \\ \hline 8 \end{array}$$

Repeat this procedure through 9 x 4 = 36. Ask the students to copy the algorithms into their notebooks in both horizontal and vertical formats.

Reverse this procedure by writing open number sentences on the chalkboard and asking the students to model them using their beansticks.

e.g.,



6 x 4 = ☐

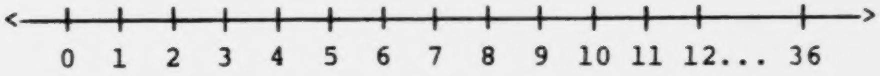
STRATEGY 1:
cont'd

Say, "How many sticks did you need to model this open number sentence? (I needed six sticks.) How many beans are on each stick? (There are four beans on each stick.) How many beans are there in all?" (There are 24 beans in all.)

Say, "How can addition be used to determine that the answer is correct? (We can use repeated addition; 4 + 4 + 4 + 4 + 4 + 4 = 24.) Why don't we just add instead of multiply?" (Multiplication is a faster way to find a total for equal addends.)

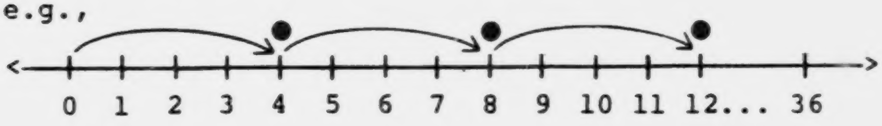
STRATEGY 2: Prepare chips to be used as markers on a number line. Display a number line.

e.g.,



Say, "Let's count on the number line. First count by ones, then by twos, then by threes, and then by fives." After the students have completed their counting, ask a student to count by fours to 12 and to place a chip at each multiple of 4. Connect each of the multiples of 4.

e.g.,



Say, "How many jumps of 4 are there from 0 to 12? (There are 3 jumps of 4 from 0 to 12.) What number sentences represent 3 jumps of 4?" (3 jumps of 4 can be represented by 4 + 4 + 4 = 12 or by 3 x 4 = 12.) Ask a student to write both the vertical and the horizontal forms of this number sentence. Say, "Why would we use multiplication rather than addition?" (Multiplication is a fast way to find a total for equal addends.)

Repeat this procedure using other multiples of 4 through 9 groups of 4.

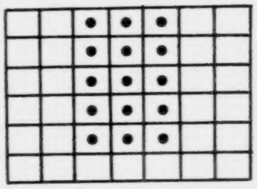
3.04.05

3.04.05.03 **apply the commutative property of multiplication to the 3 and 4 times tables**

STRATEGY 1: Prepare tape and chips. Prepare and distribute 1 inch graph paper, and buttons (cubes, chips) to each student or group of students. Say, "Today we will use these materials to make arrays." Draw a grid on the chalkboard. Ask a student to come to the chalkboard and tape chips to the chalkboard grid to model 5 groups of 3. Ask another student to write the algorithms which represent 5 groups of 3.

e.g.,

5 groups of 3



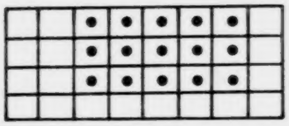
$5 \times 3 = 15$

$$\begin{array}{r}3\\ \underline{x5}\\ 15\end{array}$$

Ask the other students to use their graph paper and buttons, (cubes, chips) to model 5 groups of 3 at their desks. Ask another student to model 3 groups of 5 using the chips on the chalkboard grid.

e.g.,

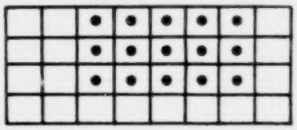
3 groups of 5



Say, "By turning your graph paper with the buttons (cubes, chips) on it, a quarter turn to either the right or the left, you will have the same model as the one on the chalkboard." Demonstrate. Ask a student to come to the chalkboard to write the algorithms which represent the new model.

e.g.,

3 groups of 5



$3 \times 5 = 15$

$$\begin{array}{r}5\\ \underline{x3}\\ 15\end{array}$$

STRATEGY 1: cont'd

Say, "How are the arrays the same? (Both arrays show 15 chips.) How are the arrays different? In the first array there are 5 rows of 3, while in the second array there are 3 rows of 5.) What multiplication rule was demonstrated when you turned your graph paper to display an array showing 3 groups of 5? (The order of the factors in multiplication does not change the product.) This is called the commutative rule for multiplication."

STRATEGY 2:

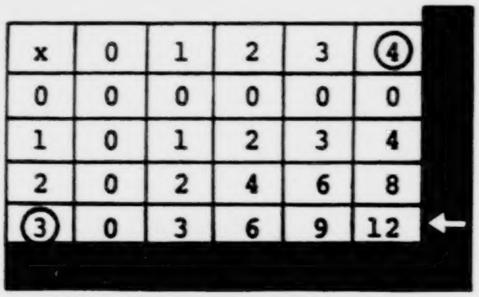
Prepare and distribute to each student a multiplication chart and a reverse L to be used as a guide. Prepare and display a multiplication chart. The numbers across the top row should be written in white. The numbers along the left column should be written in blue.

e.g.,

x	0	1	2	3	4
0	0	0	0	0	0
1	0	1	2	3	4
2	0	2	4	6	8
3	0	3	6	9	12
4	0	4	8	12	16

Ask the students to place their reverse L's on the chart so that they are aligned with a blue 3 and a white 4.

e.g.,



x	0	1	2	3	④
0	0	0	0	0	0
1	0	1	2	3	4
2	0	2	4	6	8
③	0	3	6	9	12

Say, "To which product is the arrow pointing? (The arrow is pointing to the 12.) Which two factors give

STRATEGY 2: cont'd

us that product?" (A blue 3 and a white 4 give us a product of 12.) Ask a student to come to the chalkboard and write a number sentence which represents a product of 12 using the factors 3 and 4, e.g., 3 x 4 = 12. Ask another student to use these same factors to write a different number sentence, e.g., 4 x 3 = 12. Say, "Does the order of the factors change the product? Explain." (No, the product remains the same because of the commutative law for multiplication.)

Repeat this procedure using the white 3 and the blue 4. Say, "Does the form of the example change the product?" (No, it makes no difference whether it is written in vertical or horizontal form. The product is the same.)

e.g.,

$$3 \times 4 = 12 \qquad \begin{array}{r} 4 \\ \times 3 \\ \hline 12 \end{array} \qquad \begin{array}{r} 3 \\ \times 4 \\ \hline 12 \end{array}$$
$$4 \times 3 = 12$$

Continue the activity by finding other products and their factors to show that multiplication is commutative.

3.04.05.04 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following word problem on the chalkboard:

> Ben needs ice cream sticks to make a square frame for a picture of his older brother and square frames for pictures of each of his 2 younger sisters. How many sticks will he need in all?

Ask a student to restate the problem in his/her own words. Then say, "How many frames are needed? (3 frames are needed.) How can we solve this problem?" Accept all reasonable responses.

e.g.,

- I will draw a picture of Ben's older brother and his two younger sisters and then draw a square around each. If each side of the square is an ice

STRATEGY 1:
cont'd

cream stick I can then count all the ice cream sticks.

- I will draw a square for each child and use repeated addition; $4 + 4 + 4 = 12$.
- I will write a multiplication number sentence; $3 \times 4 = 12$.
- I will write a vertical algorithm with words;

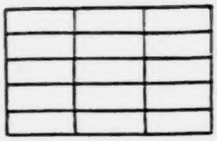
  4 sticks for each frame
  x3 children
  12 sticks in all

Say, "Which method is faster, addition or multiplication?" (Multiplication is faster than addition.)

Repeat this procedure using other stories for additional frames.

STRATEGY 2: Prepare discs and draw a bus parking lot on the chalkboard.

e.g.,



Say, "Each rectangle represents a parking space for a bus. How many buses can be parked in the lot?" Ask a student to place a disc in each parking space. Say, "How many buses are parked in each row? (There are three buses in each row.) How many buses are parked in each column? (There are 5 buses in each column.) What number represents the total number of buses parked when the parking lot is filled?" Accept all reasonable responses.

e.g.,

$$3 + 3 + 3 + 3 + 3 = 15 \qquad 5 + 5 + 5 = 15$$

$$5 \times 3 = 15 \qquad 3 \times 5 = 15$$

Ask the students to explain their choices. Elicit that multiplication is the preferred operation and that $5 \times 3 = 15$ and $3 \times 5 = 15$ are equally acceptable because of the commutative rule for multiplication.

P.O. 3.04.05.01,.02,&.04

NAME: ______________________ CLASS: ________ DATE: ________

Complete each section.

a)

● ● ● 3
● ● ● 3

2 groups of 3 = 6
2 x 3 = 6

b)

● ● ● ● 4
● ● ● ● 4
● ● ● ● 4
● ● ● ● 4
● ● ● ● 4

☐ groups of 4 = 20
5 x 4 = 20

c)

● ● ● 3
● ● ● 3
● ● ● 3
● ● ● 3

☐ ________ = ___
___ X ___ = ___

Draw an array for each number sentence.

d) 2 x 4 = 8

● ● ● ●
● ● ● ●

e) 3 x 4 = 12

f) 5 x 3 = 15

Complete each number sentence.

4 x 3 = 12	6 x 3 = ☐	4 x 4 = ☐
5 x 4 = ☐	5 x 3 = ☐	7 x 4 = ☐
2 x 3 = ☐	3 x 4 = ☐	3 x 3 = ☐

Complete each algorithm.

3	4	4	3	3
x2	x3	x5	x7	x8
6	☐	☐	☐	☐

A tricycle has 3 wheels. How many wheels do 9 tricycles have?

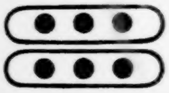
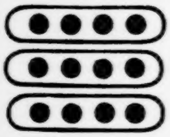
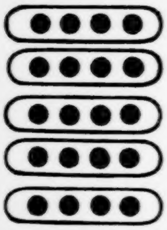
9 tricycles have __________.

P.O. 3.04.05.01 - .03

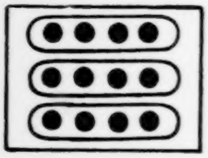
NAME: ______________________________ CLASS: __________ DATE: ________

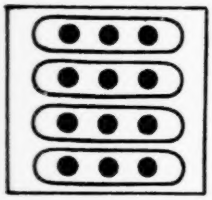
Follow the directions below.

Complete each box by writing the missing words or numbers.

a)		3 + 3 ☐	2 groups of 3	2 x 3 = ☐	3 x 2 ☐
b)		4 4 + 4 ☐	☐ groups of ___	3 x 4 = ☐	4 x 3 ☐
c)		☐ ☐ ☐ ☐ + ☐ ☐	☐ ______ of 4	__ x __ = ___	4 x 5 ☐

Which number sentence describes both pictures?





a) 3 + 3 + 3 + 3 = 12

b) 12 - 9 = 3

c) 12 - 4 = 8

d) 3 x 4 = 4 x 3

Complete each box by writing the missing numbers.

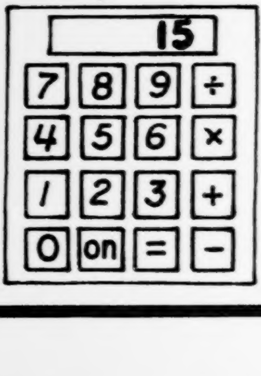
If 4 x 3 = 12, then 3 x 4 = ☐.

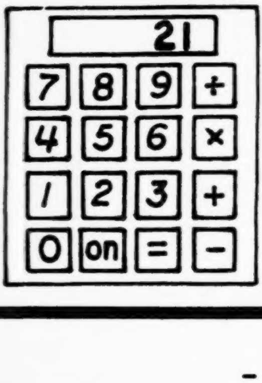
If 5 x 4 = 20, then 4 x 5 = ☐.

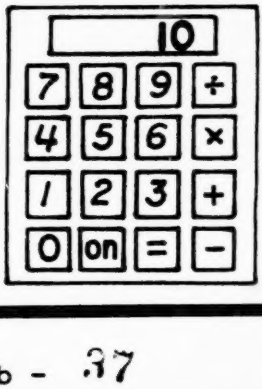
If 7 x 3 = ☐, then 3 x 7 = ☐.

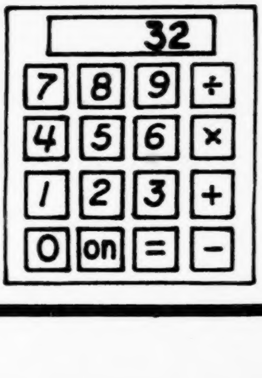
If 6 x 3 = ☐, then 3 x 6 = ☐.

CHALLENGE! Circle the digits you must press on the calculator to get the products in the window.


15
7 8 9 ÷
4 5 6 ×
1 2 3 +
0 on = −


21
7 8 9 ÷
4 5 6 ×
1 2 3 +
0 on = −


10
7 8 9 ÷
4 5 6 ×
1 2 3 +
0 on = −


32
7 8 9 ÷
4 5 6 ×
1 2 3 +
0 on = −

3.05.03 DIVISION OF WHOLE NUMBERS FOR THREES THROUGH 27, FOR FOURS THROUGH 36

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.05.03.01A divide by 3 for dividends up to 27 without a remainder;

e.g.,

check

$27 \div 3 = 9$; $3\overline{)27}$ with quotient 9 ; $3 \times 9 = 27$

3.05.03.02A divide by 4 for dividends up to 36 without a remainder;

e.g.,

check

$36 \div 4 = 9$; $4\overline{)36}$ with quotient 9 ; $4 \times 9 = 36$

3.05.03.03A solve word problems related to skills learned in this module.

e.g.,

> Martha has 32 pennies. If she makes piles of 4 pennies each, how many piles can she make?

38

3.05.03

TERMS

divide
dividend
divisor
quotient

GETTING STARTED 1:

Prepare and distribute 10 interlocking cubes, (discs, buttons) and 5 plastic bags to each student or group of students. Say, "Place 2 cubes in each bag. How many bags did you use?" (5 bags were used.) Yes, we started with 10 cubes. We placed 2 cubes in each bag. 5 bags were used." Ask a student to come to the chalkboard and subtract to show how many bags were used if 2 cubes were placed in each bag. e.g.,

$$\begin{array}{rl} 10 & \text{cubes} \\ -2 & \\ \hline 8 & \text{cubes left} \end{array} \quad \begin{array}{rl} 8 & \text{cubes} \\ -2 & \\ \hline 6 & \text{cubes left} \end{array} \quad \begin{array}{rl} 6 & \text{cubes} \\ -2 & \\ \hline 4 & \text{cubes left} \end{array} \quad \begin{array}{rl} 4 & \text{cubes} \\ -2 & \\ \hline 2 & \text{cubes left} \end{array} \quad \begin{array}{rl} 2 & \text{cubes} \\ -2 & \\ \hline 0 & \text{cubes left} \end{array}$$

Say, "How does this explain what we did? (It shows how we subtracted 2 cubes from the number of cubes we had left each time we subtracted. We were able to subtract 2 cubes five times. Therefore we used 5 bags.) How can we explain repeated subtraction in terms of division?" (In division we say, 'How many twos are in 10?' There are 5 twos in 10.) Ask a student to come to the chalkboard and write division algorithms which represent 5 twos in 10. e.g.,

$$10 \div 2 = 5 \qquad \begin{array}{r} 5 \\ 2\overline{)10} \end{array}$$

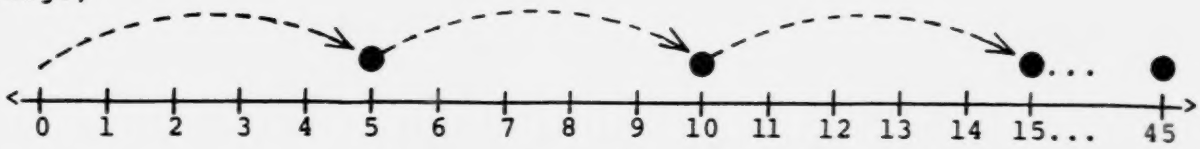
Repeat this procedure for other division facts of two and five.

GETTING STARTED 2:

Prepare and distribute number lines and discs. Draw a number line on the chalkboard. Ask a student to use the number line on the chalkboard, begin at zero, count forward by fives and place a disc above each number he/she says.

GETTING STARTED 2: cont'd

e.g.,



Ask the other students to repeat this procedure at their desks. Say, "How many jumps of 5 spaces each did it take to go from 0 to 45?" (It took 9 jumps.)

Ask a student to write the multiplication algorithms which represent the jumps on the number line.

e.g.,

$9 \times 5 = 45$ $\begin{array}{r} 5 \\ \underline{\times 9} \\ 45 \end{array}$

Reverse this procedure by removing discs. Say, "If we begin at 45, count backward by five, and remove discs, how many jumps of 5 spaces each will it take to remove the 9 discs and return to zero?" (It will take 9 jumps of 5 spaces each.) Ask a student to demonstrate at the chalkboard as the other students work at their desks.

Ask a student to write the division algorithms which represent these jumps on the number line.

e.g.,

$45 \div 5 = 9$ or $\begin{array}{r} 9 \\ 5\overline{)45} \end{array}$

Say, "How does this show how multiplication and division are related? (Multiplication is repeated addition and division is repeated subtraction. When we add equal addends it is faster to multiply. When we subtract equal subtrahends, it is faster to divide. Multiplication is similar to repeated addition and division is similar to repeated subtraction.) How are multiplication and division shown to be related in number sentences?" ($9 \times 5 = 45$ and $45 \div 5 = 9$.)

3.05.03

3.05.03.01 **divide by 3 for dividends up to 27 without a remainder**

STRATEGY 1: Prepare and distribute 27 cubes (discs, buttons) and 9 plastic bags to each student or group of students. Say, "Count the cubes on your desk. Make sure you have 27 cubes. If you place 3 cubes in each bag, how many bags will you need? (9 bags are needed.) Yes, If you begin with 27 cubes and place 3 cubes in each bag you will use 9 bags." Ask a student to come to the chalkboard and subtract to show what was done.

e.g.,

$$\begin{array}{r} 27 \\ -\ 3 \\ \hline 24 \end{array} \quad \begin{array}{r} 24 \\ -\ 3 \\ \hline 21 \end{array} \quad \begin{array}{r} 21 \\ -\ 3 \\ \hline 18 \end{array} \quad \begin{array}{r} 18 \\ -\ 3 \\ \hline 15 \end{array} \quad \begin{array}{r} 15 \\ -\ 3 \\ \hline 12 \end{array} \quad \begin{array}{r} 12 \\ -\ 3 \\ \hline 9 \end{array} \quad \begin{array}{r} 9 \\ -3 \\ \hline 6 \end{array} \quad \begin{array}{r} 6 \\ -3 \\ \hline 3 \end{array} \quad \begin{array}{r} 3 \\ -3 \\ \hline 0 \end{array}$$

Say, "How does this explain what you did? (It shows how we subtracted 3 from the number of cubes we had left each time we subtracted. We were able to subtract 3 nine times. How can we explain repeated subtraction in terms of division?" (In division we say, 'How many threes are in 27?' There are 9 threes in 27.) Ask a student to come to the chalkboard and write division algorithms which represent 9 threes in 27.

e.g.,

$$27 \div 3 = 9 \qquad \begin{array}{r} 9 \\ 3\overline{)27} \end{array}$$

Say, "How can we check our answer?" (We can check division by multiplying. Since $27 \div 3 = 9$, and each of 9 bags has 3 cubes, 9 threes = 27 or $9 \times 3 = 27$.)

STRATEGY 2: Adapt Getting Started 2, 3.05.03 to develop division by 3 for dividends up to 27.

3.05.03.02 **divide by 4 for dividends up to 36 without a remainder**

STRATEGY 1: Prepare and distribute discs and a hundreds chart to each student on group of students. Say, "Place a disc on 4, on 8, and on 12."

e.g.,

0	1	2	3	④	5	6	7	⑧	9
10	11	⑫	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29

"Say, How are we counting? (We are counting by fours.) How many discs did we use? (We used 3 discs.) At which number did we stop? (We stopped at 12.) How would we write that as a multiplication number sentence? (3 x 4 = 12.) How many discs would we remove if we counted backward by fours starting at 12? (We would remove 3 discs.) How would we write a division number sentence which represents counting backward by fours from 12 to 0?" (12 ÷ 4 = 3.)

Repeat this procedure for dividing by 4 through 36, increasing the number of discs where appropriate. Ask the students to write the division algorithms, horizontally and vertically, in their notebooks.

3.05.03.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following word problem on the chalkboard:

> On Halloween, Mr. and Mrs. Green had 32 treats to give to trick-or-treaters. If they gave four treats to each one, how many trick-or-treaters would get a treat?

Ask the students to read the problem silently as one student reads it aloud. Ask a student to restate the problem in his/her own words. Say, "How would you solve the problem?" Accept all reasonable responses.

STRATEGY 1: cont'd

e.g.,

- We could draw 32 pictures of treats. We could cut out each treat and put 4 treats into a bag for each person.
- We can pretend to be trick-or-treaters and share 32 treats by taking 4 treats each.

Say, "How many trick or treaters received a treat? (8 trick-or-treaters received a treat.) How many treats did each one receive?" (Each one received 4 treats.) Ask a student to write and solve the algorithms, both vertically and horizontally, which represent this problem, e.g., $\overset{8}{4\overline{)32}}$ or $32 \div 4 = 8$.

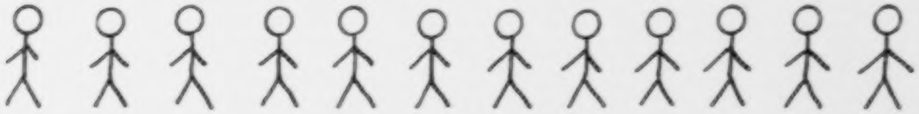
STRATEGY 2: Write the following word problem on the chalkboard:

> 12 scientists traveled to Panama in Central America to learn more about the Panama Canal. They worked in teams of 3 and planned to meet after 2 weeks to share their findings. How many teams will meet?

Say, "There are several ways to solve this problem. Let's start by drawing a picture which represents the problem." Ask a student to draw stick figures of the scientists.

e.g.,

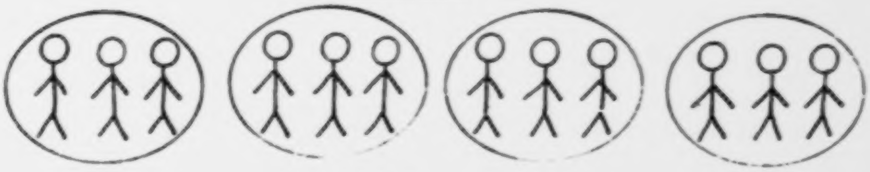
Scientists



Say, "How can this picture be used to solve the problem?" (Since they worked in teams of 3 we can draw rings around each group of 3 figures.)

e.g.,

Scientists



STRATEGY 2:
cont'd

Say, "How many teams are there? (There are 4 teams.) Is there another way to solve this problem?" (We can start with 12 and subtract 3 repeatedly until there is nothing left. Then we can count the number of times we subtracted 3.)

e.g.,

$$\begin{array}{r} 12 \\ -\ 3 \\ \hline 9 \end{array} \qquad \begin{array}{r} 9 \\ -3 \\ \hline 6 \end{array} \qquad \begin{array}{r} 6 \\ -3 \\ \hline 3 \end{array} \qquad \begin{array}{r} 3 \\ -3 \\ \hline 0 \end{array}$$

Three was subtracted 4 times.

Say, "Since we subtracted 3 four times, there are 4 teams. Is there an example we can write to represent this problem?" Some students may suggest a subtraction algorithm e.g., $12 - 3 - 3 - 3 - 3 = 0$. Other students may suggest a division algorithm.

e.g.,

$$12 \div 3 = 4$$

Elicit explanations for both and the reason why division is a more suitable approach than subtraction.

Note: Whenever there is extraneous information in a word problem, this should be elicited through the teacher's questioning techniques. The above problem has extraneous information about a meeting which will take place after 2 weeks. This information is not needed to solve the problem.

P.O. 3.05.03.01

NAME: ______________________ **CLASS:** ________ **DATE:** ________

Follow the directions below.

Divide by 3 to complete the chart.

	A	B	C	D	E	F	G	H
Dividend	21	15	6	12	18	24	9	3
Quotient	7							

Write and solve division algorithms for each of the above.

A

21 ÷ 3 = 7

$\begin{array}{r}7\\3\overline{)21}\end{array}$

B

___ ÷ ___ = ___

$\overline{)\quad}$

C

___ ÷ ___ = ___

$\overline{)\quad}$

D

___ ÷ ___ = ___

$\overline{)\quad}$

E

___ ÷ ___ = ___

$\overline{)\quad}$

F

___ ÷ ___ = ___

$\overline{)\quad}$

G

___ ÷ ___ = ___

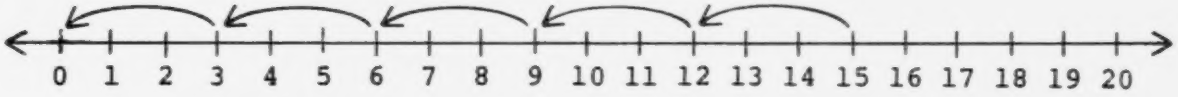
$\overline{)\quad}$

H

___ ÷ ___ = ___

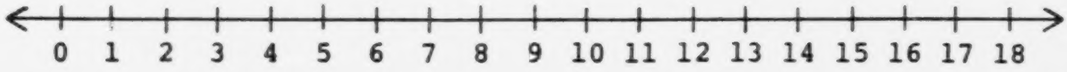
$\overline{)\quad}$

Draw a ring around the number sentence which represents the number line.


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

6 + 7 = 13 15 ÷ 3 = 5 12 ÷ 3 = 4

Show jumps on the number line which represent 12 ÷ 3 = 4.


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

P.O. 3.05.03.01 - .03

NAME: ______________________________ **CLASS:** ________ **DATE:** ________

Follow the directions below.

Complete each sentence. Then write a number sentence.

There are 5 fours in 20. 20 ÷ 4 = 5
There are ___ fours in 16. ____ ÷ ____ = ____
There are ___ fours in 24. ____ ÷ ____ = ____
There are ___ fours in 8. ____ ÷ ____ = ____
There are ___ fours in 36. ____ ÷ ____ = ____
There is ___ four in 4. ____ ÷ ____ = ____
There are ___ fours in 12. ____ ÷ ____ = ____
There are ___ fours in 28. ____ ÷ ____ = ____
There are ___ fours in 32. ____ ÷ ____ = ____

Divide and check.

$\begin{array}{r}4\\3\overline{)12}\end{array}$ check 3 x 4 = 12

$4\overline{)16}$ check

$3\overline{)18}$ check

$3\overline{)36}$ check

$4\overline{)24}$ check

$4\overline{)8}$ check

$4\overline{)20}$ check

$3\overline{)9}$ check

$3\overline{)15}$ check

Read the story and solve each problem.

21 people were in a spring balloon contest. Each balloon carried 3 people. How many balloons were in the race?

There were _____ balloons in the race.

36 people attended the party given for the people in the balloon race. If 4 people shared a whole chicken, how many chickens were needed for the party?

There were _____ chickens needed for the party.

P.O. 3.05.03.03

NAME:______________________ CLASS:________ DATE:________

Solve the problems below.

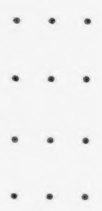
1. 32 students from Ms. Chin's class went on a winter camping trip. If 4 students shared a tent, how many tents were needed? _______ tents were needed.	solve
2. 18 students will prepare the meals on Saturday and on Sunday. If 3 students prepare each meal, how many meals will be prepared? _______ meals will be prepared.	solve
3. In an ice skating race there were 15 trips around the lake. If 3 trips around were made by each camper, how many campers participated? _______ campers participated.	solve
4. The campers made pine cone picture frames. They used a total of 36 pine cones to make 4 frames. How many pine cones were used for each frame? _______ pine cones were used for each frame.	solve
5. 24 students made posters which said, PREVENT FOREST FIRES. If 3 students worked on each poster, how many posters were made? _______ posters were made.	solve

SHARPENING YOUR SKILLS

Units 38,39

Name: ______________ **Class:** __________ **Date:** __________

1. This array shows ________.



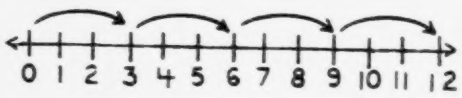
ⓐ 5 + 3 = 8

ⓑ 4 x 3 = 12

ⓒ 15 - 3 = 12

ⓓ 5 x 3 = 15

2. This number line shows ______.



ⓔ 3 + 9 = 12

ⓕ 4 x 3 = 12

ⓖ 12 ÷ 3 = 4

ⓗ 12 - 12 = 0

3. If 4 x 6 = 24 then 6 x ☐ = 24
4. If 8 x 3 = 24 then 3 x ☐ = 24
5. If 6 x ☐ = 18 then 3 x 6 = 18
6. If 9 x 3 = 27 then ☐ x 9 = 27

7. Another way to show 32 ÷ 4 is ________.

ⓐ 32 - 4

ⓑ 8 x 3

ⓒ $4\overline{)8}$

ⓓ $4\overline{)32}$

8. 7 children visited Riis Park in Queens. Each child brought 3 dollars. How much money did they have in all?

They had ______ dollars in all.

9. The children bought ice cream at a stand on the boardwalk. They received 32 pennies in change. If 4 children shared the pennies equally, how many pennies will each child get?

Each child will get ________ pennies.

10. 5 children each went swimming in the Atlantic Ocean 3 times during the day. How many swims did they have in all?

They had ________ swims in all.

Unit 40

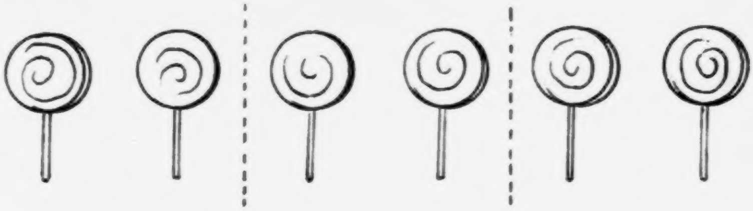
3.06.02 NON-UNIT FRACTIONAL PARTS OF A GROUP

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.06.02.01B separate a number of objects into non-unit fractional parts; e.g.,



$\frac{2}{3}$ of 6 lollipops

3.06.02.02B solve word problems related to skills learned in this module. e.g.,

> Mary baked 12 pies. She must give $\frac{2}{4}$ of the pies to her best friend. How many pies will she give away?

3.06.02

VOCABULARY

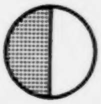
TERMS

numerator denominator	fraction

GETTING STARTED 1:

Distribute tape, circles, squares, rectangles and hexagons to each student. Say, "Fold the circle into halves." Demonstrate. Say, "Into how many parts did you divide the circle?" (We divided the circle into 2 equal parts.) Ask the students to shade 1 of the 2 parts. Say, "What can we call the shaded part of the circle?" (We can call it one half.) Ask a student to write the fraction, $\frac{1}{2}$ on the chalkboard. Say, "Tape your circle into your notebook and write $\frac{1}{2}$ next to it."

e.g.,



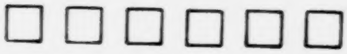
$\frac{1}{2}$

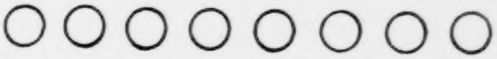
Repeat this procedure for thirds, fourths, sixths, and eighths using the squares, rectangles, and hexagons.

GETTING STARTED 2:

Prepare and distribute cubes, (discs, buttons) to each student or group of students. Display an even numbered groups of objects.

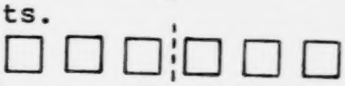
e.g.,



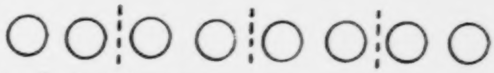


Ask the students to use their cubes to duplicate the displayed groups of objects. Ask a student to separate the cubes into 2 equal groups as the other students do the same at their desks. Say, "What fractional name can we give to each group of 3 cubes?" (Each group of 3 cubes can be called $\frac{1}{2}$. Repeat this procedure for the discs and label the parts.

e.g.,



$\frac{1}{2}$ of 6 cubes



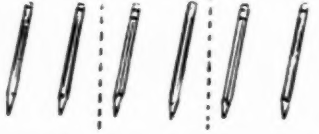
$\frac{1}{4}$ of 8 discs

Repeat this procedure using other models for unit fractions of a group.

3.06.02

3.06.02.01 separate a number of objects into non-unit fractional parts

STRATEGY 1: Prepare 1 dozen pencils or other small objects. Say, "We have seen how a group of objects can be separated so that we can identify $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, and $\frac{1}{8}$ of the group." Display 6 pencils. Say, "If we separate these pencils into 3 equal groups, how many pencils will be in each group?" (There will be 2 pencils in each group.) Ask 3 students to demonstrate by each holding 2 pencils. Say, "What fractional name can we give to each group of 2?" (Each group of 2, can be called $\frac{1}{3}$ of the whole group.) Ask 2 of the students to give you their pencils. Say, "How many pencils am I holding? (You are holding 4 pencils.) If 2 pencils are $\frac{1}{3}$ of 6 then what fractional part of 6 are 4 pencils?" (4 pencils are $\frac{2}{3}$ of 6 pencils.) Write the following on the chalkboard:



$\frac{1}{3}$ of 6 pencils = 2 pencils

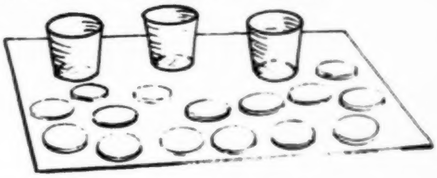
$\frac{2}{3}$ of 6 pencils = 4 pencils

Ask the students to copy this into their notebooks.

Repeat this procedure using other models for non-unit fractions from halves through eighths.

STRATEGY 2: Prepare and distribute plastic cups, discs, and a placemat to each student or small group of students. Ask the students to place 15 discs and 3 cups on their placemats. Demonstrate.

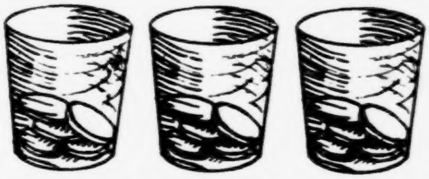
e.g.,



Ask the students to separate the discs equally into the 3 cups. Say, "How many discs are in each cup? (There are 5 discs in each cup.) What fractional part of the discs is in each cup?" (One third of the

STRATEGY 2: cont'd

discs is in each cup.) Ask the students to place 2 cups of 5 discs side by side. Say, "How many discs are in 2 cups? (There are 10 discs in 2 cups.) If 1 cup of 5 discs equals one third of 15, then what do 2 cups of 5 discs or 10 discs equal?" (10 discs equal two thirds of 15.) Write the following on the chalkboard:



$\frac{1}{3}$ of 15 = 5

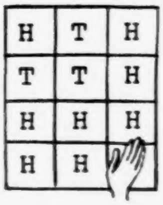
$\frac{2}{3}$ of 15 = 10

Repeat this procedure using other models of non-unit fractions.

3.06.02.02 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare and display the following chart for distribution to each student or small group of students.

e.g.,



H	T	H
T	T	H
H	H	H
H	H	

Say, "There are 12 coins on the chart. Three fourths of the coins show heads. (H) Is the hand covering a head (H) or a tail (T)? Explain your answer." Accept all reasonable responses.

e.g.,

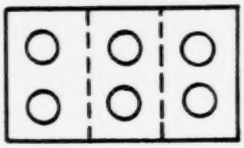
- I know that $\frac{1}{4}$ of 12 equals 3 and $\frac{2}{4}$ of 12 equals 6, therefore $\frac{3}{4}$ of 12 must equal 9.
- There should be 9 heads (H). Since I see 8 heads, the one covered by the hand must also be a head (H).
- I can solve this problem by using coins to model those on the chart.

Repeat this procedure using play money. Ask the students to create problems relating to non-unit fractional parts of group.

3.06.02

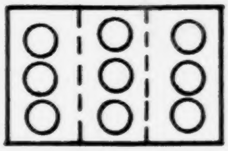
STRATEGY 2: Prepare and distribute 20 discs to each student or group of students. Prepare and display representations of cookie boxes with cookies in them.
e.g.,

cookie box A



$\frac{2}{3}$ of 6

cookie box B



$\frac{2}{3}$ of 9

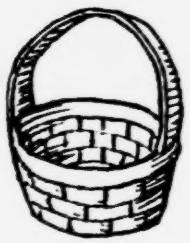
Say, "Each box of cookies from the cookie factory contains several different kinds of cookies. Chocolate chip cookies are one kind that have been placed in each box. The number of chocolate chip cookies is represented by the fraction below each box. Look at box A. How can we determine how many cookies are chocolate chips? (In box A it shows how the cookies were divided equally into 3 groups. If each group of 2 cookies equals $\frac{1}{3}$ of the cookies, then 2 groups with 2 cookies in each group or 4 cookies equal $\frac{2}{3}$ of the cookies.) Look at box B. How can we find $\frac{2}{3}$ of 9 cookies?" (Divide the cookies into 3 equal groups. Each group has $\frac{1}{3}$ of the cookies or 3 cookies. $\frac{2}{3}$ of 9 is 2 groups of 3 or 6.)

Ask the students to use their discs to create and solve similar problems for non-unit fractions representing a group of objects, e.g., $\frac{2}{4}$, $\frac{3}{4}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{4}{5}$, $\frac{2}{6}$, $\frac{3}{6}$, $\frac{2}{8}$, $\frac{3}{8}$, $\frac{4}{8}$, $\frac{5}{8}$.

P.O. 3.06.02.01

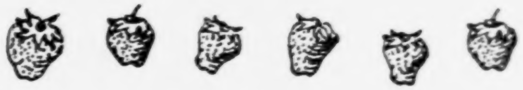
NAME: ______________________ CLASS: ________ DATE: ________

Follow the directions below.



This basket will hold $\frac{2}{3}$ of the strawberries.

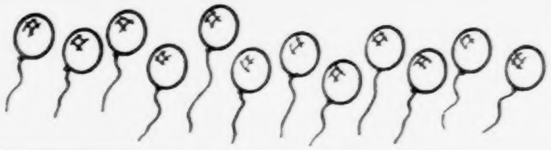
Draw a ring around $\frac{2}{3}$ of the strawberries.



$\frac{2}{3}$ of 6 = ☐

Paul will buy $\frac{3}{4}$ of the balloons.

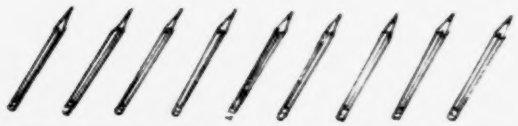
Draw a ring around $\frac{3}{4}$ of the balloons.



$\frac{3}{4}$ of 12 = ☐

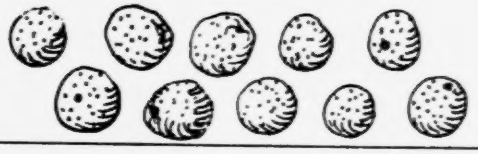
The pencil cup will hold $\frac{2}{3}$ of the pencils.

Draw a ring around $\frac{2}{3}$ of the pencils.



$\frac{2}{3}$ of 9 = ☐

The pitcher will hold the juice of $\frac{4}{5}$ of the oranges.
Draw a ring around $\frac{4}{5}$ of the oranges.

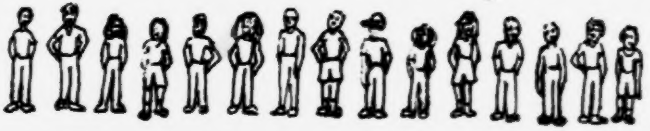


$\frac{4}{5}$ of 10 = ☐

P.S. 4
SOCCER
TEAM

$\frac{3}{5}$ of the students will join the team.

Draw a ring around $\frac{3}{5}$ of the students.

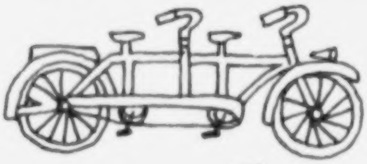


$\frac{3}{5}$ of 15 = ☐

P.O. 3.06.02.02

NAME: ______________________ CLASS: ________ DATE: ________

Solve the problems below.

1. The distance around Central Park is 6 miles. If Charles ran $\frac{2}{3}$ of the distance, how far did he run? Charles ran ____________ miles.	**solve** $\frac{2}{3}$ of $6 = 4$
2. Sandy baked 20 cupcakes for the picnic in the park. $\frac{3}{4}$ of them were chocolate. How many chocolate cupcakes did Sandy bake? Sandy baked ____________ chocolate cupcakes.	**solve**
3. 24 children entered the 3-legged relay race. $\frac{2}{6}$ of them were boys. How many boys entered the race? ____________ boys entered the race.	**solve**
4. 10 children wanted to rent rowboats. There were enough rowboats for only $\frac{2}{5}$ of the children. How many children went rowing? ____________ children went rowing.	**solve**
Do you remember? 18 children rented bicycles built for 2. If 2 children shared each bicycle, how many bicycles did they rent?  They rented __________ bicycles.	**solve**

Unit 41

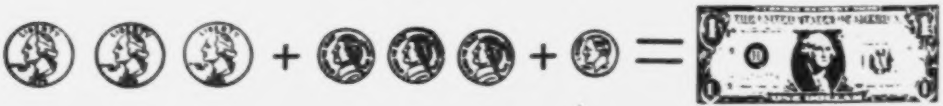
3.10.07 RECOGNIZE AND COMPARE RELATIONSHIPS (ONE DOLLAR, FIVE DOLLARS, AND TEN DOLLARS)

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

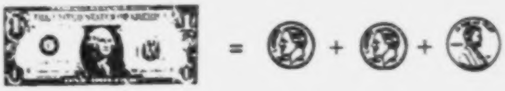
*3.10.07.01A show equivalent values of a dollar bill; e.g.,



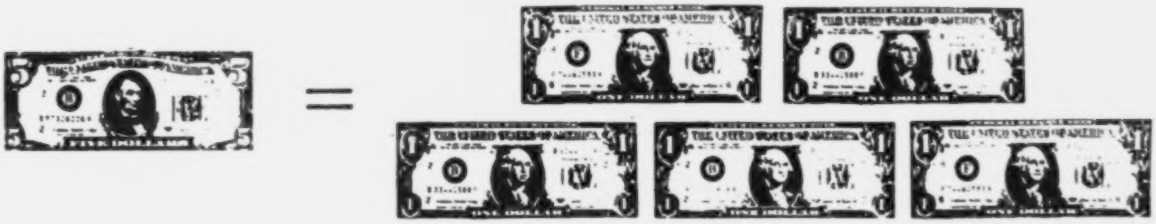
3.10.07.02A use combinations of coins to make change through the value of one dollar; e.g.,

A toy costs 79¢

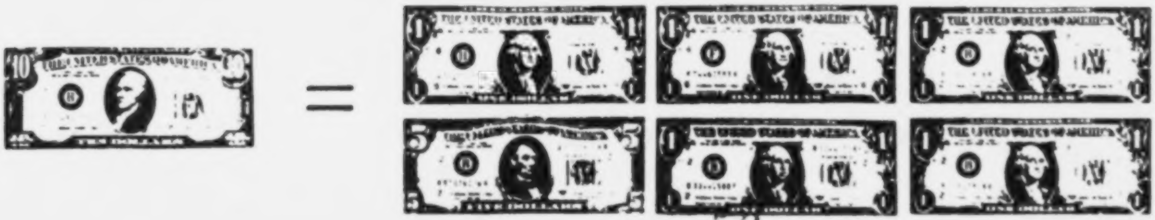
The change from



*3.10.07.03A recognize and identify a five dollar bill and its equivalent values; e.g.,



3.10.07.04A recognize and identify a ten dollar bill and its equivalent values. e.g.,



GETTING STARTED 1:

Prepare and distribute to several groups of students the following coins: pennies, nickels, dimes, quarters, and half-dollars. On the chalkboard write 38¢. Ask a student to read the amount and say, "Use your coins to show combinations which equal 38¢." Ask the students to write their combinations on the chalkboard and in their notebooks. e.g.,

Coins Equal to 38¢

quarters	dimes	nickels	pennies
0	3	0	8
1	0	2	3
0	0	0	38
1	1	0	3
0	0	7	3

Elicit that the fewest number of coins equal to 38¢ are 1 quarter, 1 dime and 3 pennies and the greatest number of coins equal to 38¢ are 38 pennies.

Repeat this procedure using other amounts of money less than $1.00.

GETTING STARTED 2:

Write the following on the chalkboard:

Supplies

pencil	15¢	paste	25¢
crayons	30¢	ruler	50¢
paper	79¢	eraser	20¢

Say, "A group of students in class 3-327 will need supplies to write a report and create a bulletin board about the Statue of Liberty. Each student will buy 2 items from the supply list. The total amount each student may spend must be less than one dollar. Choose 2 items totaling less than $1.00, and determine the amount of change you will get from one dollar."

3.10.07

3.10.07.01 show equivalent values of a dollar bill

STRATEGY 1: Prepare and distribute several groups of coins to groups of students. Each group should include several coins of every denomination from pennies to half-dollars. Display a dollar bill or facsimile. Say, "We have seen this piece of paper before. What is it? (It is a dollar bill.) For what is it used? (A dollar bill is money. It is used to buy things.) Sometimes we don't have a dollar but we have a lot of change. Suppose we have 10 dimes. How much is a dime worth? (A dime is worth 10¢.) 10 dimes equal 1 dollar." Ask the students to display 10 dimes. Say, "Now remove 1 dime. What coins equal to 1 dime could we use to replace the dime?" (We could use 2 nickels or 1 nickel and 5 pennies or 10 pennies.) Use other coins to show amounts equal to a dollar.

Display a chart to be completed by the students after they have experimented with different combinations of coins equal to a dollar.
e.g.,

COMBINATIONS OF COINS EQUAL TO A DOLLAR				
half-dollars	quarters	dimes	nickels	pennies
1	2			
	1	5	5	
		10		
1	1	1	1	10

Say, "What are the fewest coins equal to a dollar? (2 half-dollars) What are the greatest number of coins equal to a dollar?" (100 pennies) Encourage the students to create challenging questions to ask their classmates.

Note: There are many other possible combinations which equal 1 dollar. Sharpening Your Skills, p.48d, question 6, deals with this point for $1, $5, and $10 bills.

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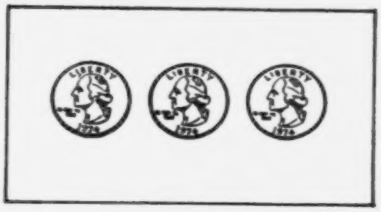
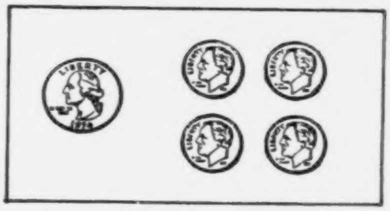
STRATEGY 2: Prepare several coins of every denomination, from pennies to half-dollars. Prepare 3 x 5 index cards with coins drawn on each, not to exceed 99¢ in value.

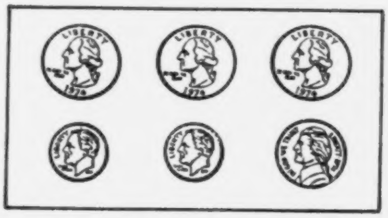
e.g.,





Place the cards face down. Ask the students to say the value of each coin, e.g., 1 penny = 1 cent, 1 nickel = 5 cents, 1 dime = 10 cents, 1 quarter = 25 cents, 1 half-dollar = 50 cents. Say, "A dollar equals 100 cents. When you select a card look at the coins indicated on the card. Add play money to the card so the coins on the card plus the play money equal one dollar."

e.g.,



Reverse this procedure by asking the students to display play money and then create a card which, together with the play money, will equal one dollar.

3.10.07.02 **use combinations of coins to make change through the value of one dollar**

STRATEGY 1: Prepare groups of coins. Write a word problem on the chalkboard.

e.g.,

> Miriam bought pencils for 49¢. She gave the store clerk $1.00. How much change should she have received? How can she check to be certain she received the correct change?

3.10.07

STRATEGY 1: cont'd

Say, "Miriam can determine the amount of change she should receive by counting up. She should begin at 49. Why? (She paid 49¢ for the candy.) She should then add coins to 49¢, beginning with pennies until she reaches the next number rounded to 10 or 5. What is the next number in this case? (50 is the next number.) Miriam can then determine how much more she needs to reach 100 pennies or $1.00. How can she determine that?" Accept all reasonable responses. Some students will immediately know that 1¢ plus 50¢ = 51¢ which is the correct change. Some students may choose to count by tens while others may see 25¢ + 25¢ + 1¢ = 51¢.

Say, "If she received the correct change, and she counted correctly, what should her sum be when she has finished counting? (She should have 100¢ or one dollar.) Why do you think this method is called counting up? (It might be called counting up because you start with the amount you spent and keep adding change until you reach a dollar.) How much change did she receive? (She received 51¢.) How can we check that this is the correct amount?" (We could add 49¢ + 51¢. If it equals 100¢, it is correct.)

Repeat this procedure using several other amounts.

3.10.07.03 **recognize and identify a five dollar bill and its equivalent values**

STRATEGY 1: Prepare and display facsimiles of five dollar bills and one dollar bills. Distribute facsimiles to groups of students. Say, "Look at the one dollar bill. Is there anything on it which tells you that it is worth one dollar? (There is a number 1 in every corner of the bill, front and back.) Are there any other signs that tell you this is a one dollar bill? (It has the word 'ONE' in two places on the

60

STRATEGY 1: cont'd front and six places on the back.) Now look at the five dollar bill. How many times does the number 5 appear on the bill? (Number 5 appears on the bill 10 times; 8 on the front and 2 on the back.) How many times does the word FIVE appear? (The word 'FIVE' appears on the bill 11 times; 4 on the front and 7 on the back.) With all those fives it's easy to recognize a five dollar bill. Why do you think it's called five dollars? (It's called five dollars because it's worth the same as 5 one dollar bills.) If we have two 1 dollar bills, how many more do we need to equal a five dollar bill?" (We need three more.)

3.10.07.04 **recognize and identify a ten dollar bill and its equivalent values**

STRATEGY 1: Prepare and display facsimiles of ten, five, and one dollar bills. Distribute facsimiles to groups of students. Ask the students to count the numbers 10 and the words TEN on the 10 dollar bill. Say, "Look at the ten, the five, and the one dollar bills. What are some of the differences? What is the same about them?" Elicit the differences in the pictures and the numbers. Elicit similarities such as the size, shape, and color of the bills.

Write a chart on the chalkboard with columns marked for one, five, and ten dollar bills.
e.g.,

Combinations of Bills Equal to $10		
$10	$5	$1

STRATEGY 1: cont'd

Say, "If we have $10, there are 4 different combinations of bills equivalent to $10. Write this chart in your notebooks and list the four combinations."

e.g.,

Combinations of Bills Equal to $10		
$10	$5	$1
0	2	0
1	0	0
0	0	10
0	1	5

Elicit answers to the following questions:

- What combinations have you found?
- What are the fewest bills equal to $10?
- What are the greatest number of bills equal to $10?

P.O. 3.10.07.01-.02

NAME:______________________________CLASS:________DATE:________

Follow the directions below.

Complete each line in the chart so the total value of the coins equals 1 dollar.

Coins Equal to $1.00				
half-dollars	quarters	dimes	nickels	pennies
1	1		2	
0	2	2		
0	0			
1	0			
		7		10
0	3			
			6	15

Solve the problems below.

1. Mrs. Greene's class went to the Museum of Natural History. Several students bought dinosaur figures, each costing 67¢. How much change did each student receive from a dollar? Each student received _______.	solve
2. The class had snacks at the Museum cafeteria. Maria bought an apple, a cookie, and milk for a total of 84¢. If she gave the cashier $1.00, how much change should she have gotten? She should have gotten _____ in change.	solve
3. After lunch Pete bought a postcard for 53¢. How much change did he receive from a $1.00 bill? He received _______.	solve

P.O. 3.10.07.03

NAME: ______________________ **CLASS:** ________ **DATE:** ________

Follow the directions below.

Solve the problems below.

1. Kevin will buy a model of the Empire State Building for $5.00. He has 3 one dollar bills and 4 quarters. How much more money does he need ?

   He needs _______ dollar more.

2. Bobby spent 3 dollars for a model Corvette. He gave the shop keeper a 5 dollar bill. Bobby received 1 dollar and several dimes in change.

   Bobby received 1 dollar and _____ dimes in change.

3. How can a cashier make 5 dollars change using bills only ?

   ____

   ____

Circle the amounts which show five dollars.

a. 4 one dollar bills, 8 dimes, 4 nickels
b. 4 one dollar bills, 4 quarters
c. 4 one dollar bills, 3 quarters, 2 nickels, 5 pennies
d. 4 one dollar bills, 2 quarters, 4 nickels, 5 pennies

CHALLENGE!

Imagine that you are the cashier at Marvin's Models. List the combinations of bills and coins you can make from a twenty dollar bill.

____

____

____

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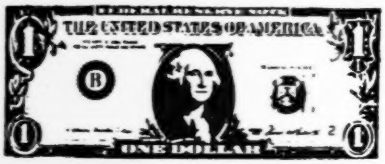
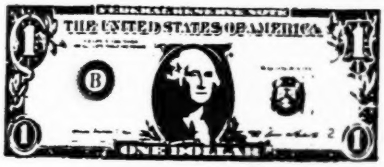
P.O. 3.10.07.04

NAME: ______________________ CLASS: __________ DATE: __________

Cut out the money along the perforated lines.
Show all the ways you can make $10.00.
Paste each combination of $10.00 into your notebook.


THE UNITED STATES OF AMERICA
ONE DOLLAR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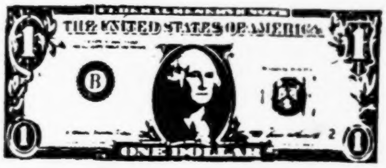
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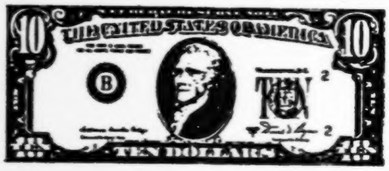
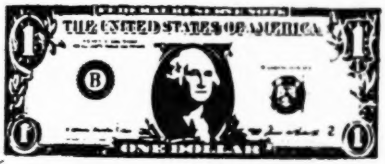
ONE DOLLAR


THE UNITED STATES OF AMERICA
TEN
TEN DOLLARS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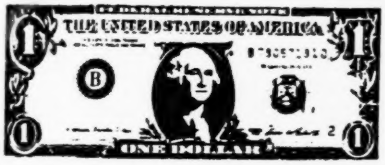
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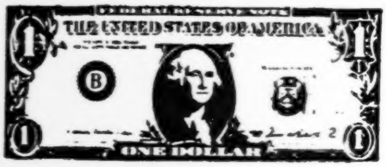
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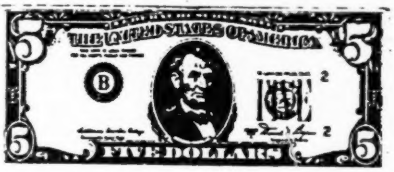
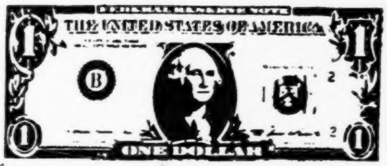
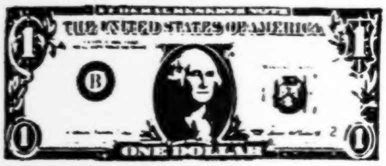

THE UNITED STATES OF AMERICA
FIVE DOLLARS


THE UNITED STATES OF AMERICA
ONE DOLLAR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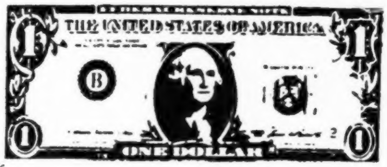
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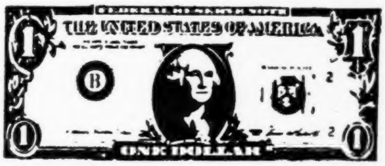
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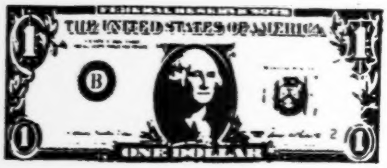
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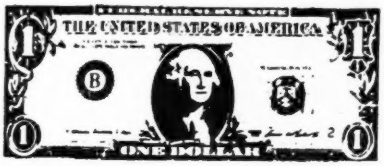
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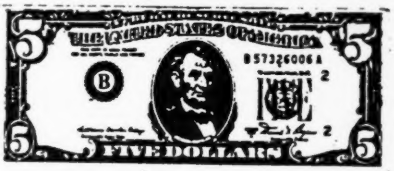
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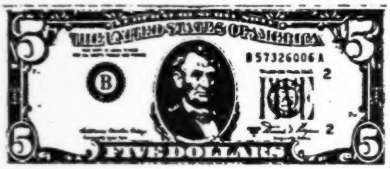
FIVE DOLLARS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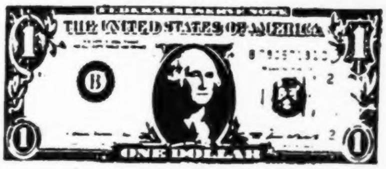
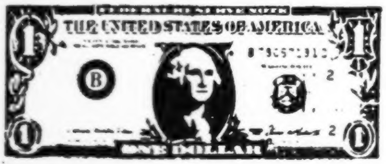
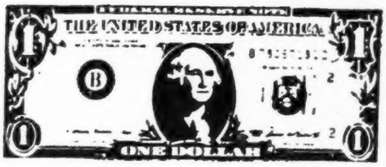

THE UNITED STATES OF AMERICA
ONE DOLLAR


THE UNITED STATES OF AMERICA
ONE DOLLAR

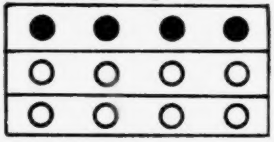

THE UNITED STATES OF AMERICA
ONE DOLLAR

SHARPENING YOUR SKILLS

Units 40, 41

Name: ______________________ **Class:** ___________ **Date:** ___________

1. Which number sentence is represented by this array?



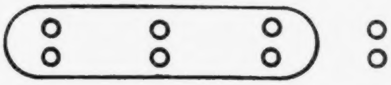
ⓐ $8 - 4 = 4$

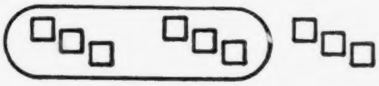
ⓑ $\frac{1}{3}$ of $15 = 5$

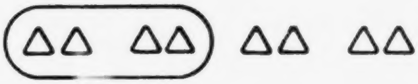
ⓒ $12 - 5 = 7$

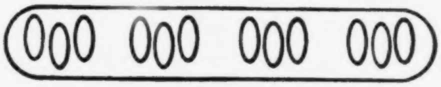
ⓓ $\frac{1}{3}$ of $12 = 4$

2. Which picture represents $\frac{3}{4}$ of 8?

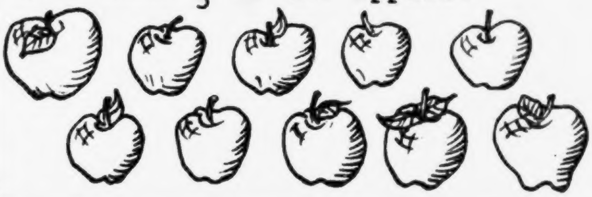
ⓔ 

ⓕ 

ⓖ 

ⓗ 

3. Shade $\frac{2}{5}$ of the apples.



4. Kevin spent 94¢. He gave the clerk $1.00. Which coins did he receive as change?

ⓐ 1 nickel, 1 penny

ⓑ 1 dime, 1 penny

ⓒ 1 quarter, 1 penny

ⓓ 4 pennies

5. Which group of coins is equal in value to $1.00?

ⓔ 3 quarters, 1 nickel

ⓕ 10 dimes

ⓖ 1 half-dollar, 1 nickel, 1 dime

ⓗ 10 nickels

6. Complete each sentence to make it true.

$10.00 equals 1 five dollar bill and ____________________

______________________________.

$5.00 equals 2 one dollar bills and ________________

______________________________.

$1.00 equals 2 quarters and

______________________________.

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Unit 42

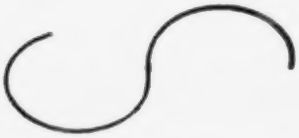
3.09.03 OPEN AND CLOSED FIGURES AND CURVES

(1 lesson)

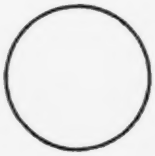
PERFORMANCE OBJECTIVES

The student will be able to...

3.09.03.01B recognize open and closed curves; e.g.,

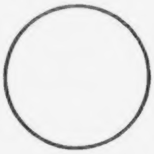


open

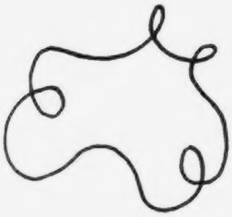


closed

3.09.03.02B recognize simple closed curves and complex closed curves. e.g.,



simple closed curves



complex closed curves

3.09.03

VOCABULARY

TERMS

continuous	region
closed	right angle

GETTING STARTED 1:

Display geometric shapes and their associated names.

e.g.,

triangle △

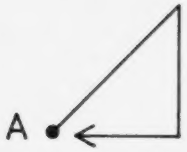
circle ○

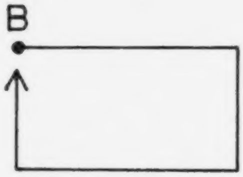
rectangle ▭

square □

Ask several students to model each shape by holding hands and forming each configuration. Say, "How many sides does a triangle have?" (A triangle has 3 sides.) How many sides does a circle have?" (A circle doesn't have sides.) Repeat this procedure for a rectangle and a square. Say, "Triangles, squares, and rectangles all have sides. Do they have anything else in common? (They all have angles.) Can someone tell us how many angles they have? (Triangles have 3 angles, rectangles and squares have 4 angles.) We call the angles of a rectangle and square by a special name. What are they called? (They are called right angles.) How can we draw each shape without ever taking our pencils off the paper?" Ask several students to demonstrate how, by beginning the figure on the chalkboard at one point, he/she can complete the figure at the same point.

e.g.,





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3.09.03

3.09.03.01 **recognize open and closed curves**

STRATEGY 1: Prepare and distribute a disc and a ruler to each student or group of students. Display the geometric shapes and names as in Getting Started 1.

Say, " Use your ruler and disc to help you draw the picture of each figure in your notebook. Start at one point and try to draw the figures without taking your pencils off the paper. If you can draw the entire figure without stopping, the line is continuous. What does continuous mean? (When something is continuous it goes on and on without stopping.) When a figure is made by a continuous line, it is called a curve."

Ask several students to form a circle by holding hands. Ask a student to try to enter the circle. Say, "Why can't you get inside the circle? (I can't get in because there are no openings.) If there are no openings, we say the figure is closed. If the figure is made by a continuous line and there are no openings, we say it is a closed curve."

Draw a circle on the chalkboard. Say, "This circle represents the students who are standing in a circle and holding hands. Can the circle be drawn with a continuous line? (Yes.) Are there any openings? (No.) What do we call a figure like this?" (We call it a closed curve.)

Repeat this procedure for triangles, rectangles, and squares.

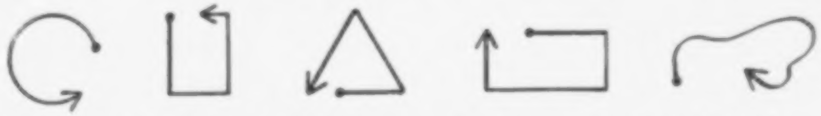
Ask two of the students forming the circle to release their hands. Say, "Why can you get inside the circle now?" (There is an opening.) Ask a student to draw a representation of this on the chalkboard.

STRATEGY 1: cont'd

Say, "A curve that has an opening is called an open curve. It means that it does not start and stop at the same point."

e.g.,

Open Curves

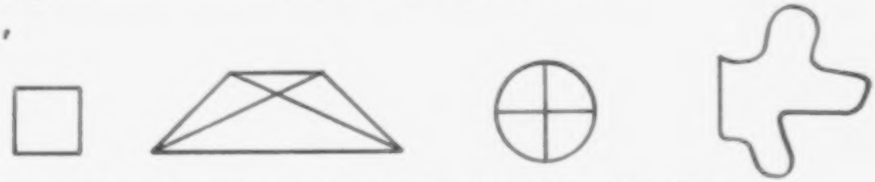


Note: In this illustration, the dot represents the start of the curve and the arrow represents the direction in which the curve is drawn. Relate to the students that the dot and the arrow are not part of the curve.

Repeat this procedure using various figures. Ask the students to draw them on the chalkboard and in their notebooks. Summarize by saying, "Do they start and finish at the same point? Can they be drawn with a continuous line? What name do we give these figures?" (We call these figures open curves.)

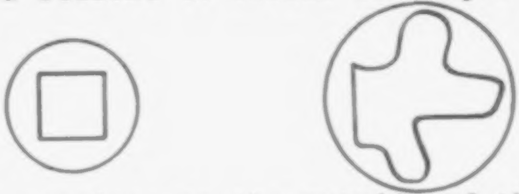
STRATEGY 2: Say, "A curve is a figure that we draw with a continuous line, without ever taking our pencils off the paper or tracing over any lines. Try to copy these pictures following those two rules.

e.g.,



Ask several students to trace the figures to determine whether they are curves according to the above criteria. Ask a student to circle the figures which are curves.

e.g.,

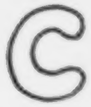


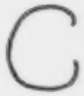
Say, "If there are no openings on the outside of the curve, we call it a closed curve. If there is an opening, we call it an open curve." Draw an open and closed curve on the chalkboard.

3.09.03

STRATEGY 2: cont'd

e.g.,

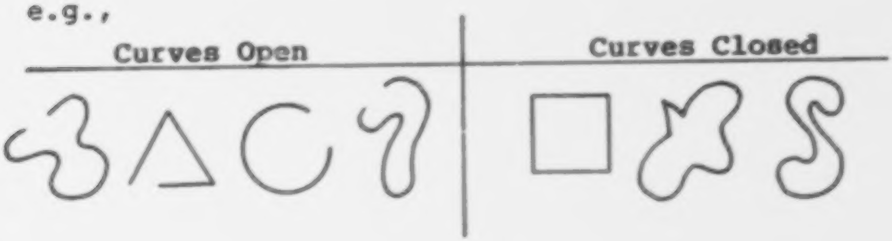
A 

B 

Say, "Which of these figures are curves? Both A and B are curves.) What makes them curves? (We can draw each with one continuous line without tracing any line.) Which are closed curves? (Figure A is a closed curve.) What kind of figure is B?" (Figure B is an open curve.) Ask the students to draw open and closed curves on the chalkboard.

Ask the other students to explain which are open and which are closed and why. Ask them to copy them into their notebooks under separate headings.

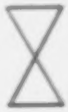
e.g.,



3.09.03.02 **recognize simple closed curves and complex closed curves**

STRATEGY 1: Prepare geoboards and rubber bands for each student or group of students. Say, "Make a rectangle with a rubber band. Now take one end of the rectangle and twist it to make an hourglass shape."

e.g.,



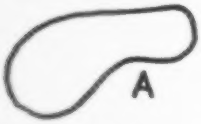
Say, "What kind of figure is the rectangle? (It is a closed curve.) What kind of figure is the hourglass? (It is also a closed curve?) How are they similar? (They can both be drawn with a continuous line without retracing any lines.) How are they different? (The rectangle has no lines which cross each other.) When a closed curve has no crossing

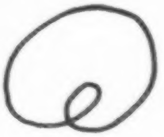
3.09.03

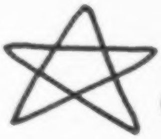
STRATEGY 1: cont'd

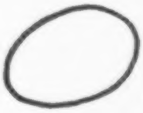
lines, it is called a simple closed curve. When a closed curve has lines which cross, it is called a complex closed curve. Draw several simple and complex curves on the chalkboard."

e.g.,


A


B

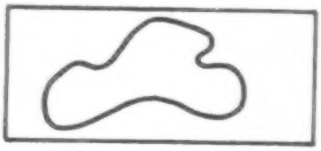

C


D

Say, "Look at figure A. What kind of figure is it? (It is a simple closed curve.) Explain." (It is drawn with one continuous line which does not cross itself.) Repeat this procedure for each figure. Ask the students, where possible, to make the figures on their geoboards. Say, "Is the curve open or closed? Is it simple or complex? Explain." Ask the students to copy the figures into their notebooks and label them open or closed, simple or complex.

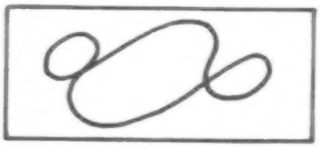
STRATEGY 2: Prepare crayons and a group of cards, some with simple and some with complex closed curves. Display a card showing a simple closed curve.

e.g.,



Say, "How many regions or areas does this closed curve have? (It has 1 region.) How many regions does the card have? (There are 2 regions on this card, the one inside the curve, and the one outside the curve.) Shade each region a different color. Now let's look at a different type of closed curve."

e.g.,

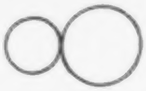


STRATEGY 2: cont'd

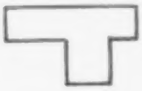
Say, "How many regions does this closed curve have?" (This closed curve has 3 regions, a large center region, and 2 smaller regions which are represented by loops.) How many regions are on the card? (There are 4 regions on the card.) Ask a student to shade or color each region a different color. Say, "How is this different from a simple closed curve? (It has many different regions.) This is called a complex closed curve. It is complex because it creates more than two regions on the card. Does a complex closed curve retrace any of its lines? (No. A curve does not retrace its lines.) What common figure do you know that is a complex closed curve?" Accept all reasonable answers, e.g., the figure 8, an hour glass figure ... Say, "How many different regions will an 8 make on a card?" (It will make 3 regions.) Draw a set of closed curves on the chalkboard and ask the students to label each as simple or complex.

e.g.,

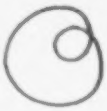
1



2



3



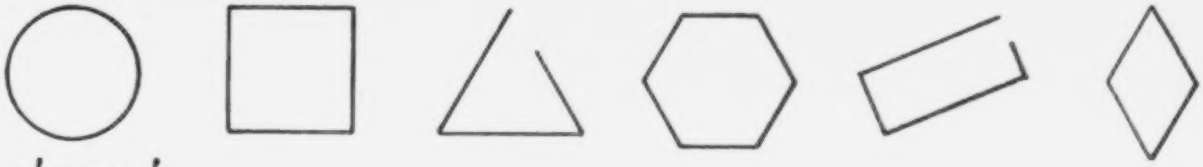
Summarize by saying, "Is figure 1 a closed curve? Is it simple or complex? Are any of the figures open curves? Are any of them simple? Into how many regions will it divide a card?" Discuss each figure in detail.

P.O. 3.09.03.01-.02

NAME: ______________________ **CLASS:** ________ **DATE:** ________

Follow the directions below.

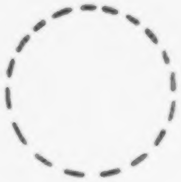
Label each curve open or closed.



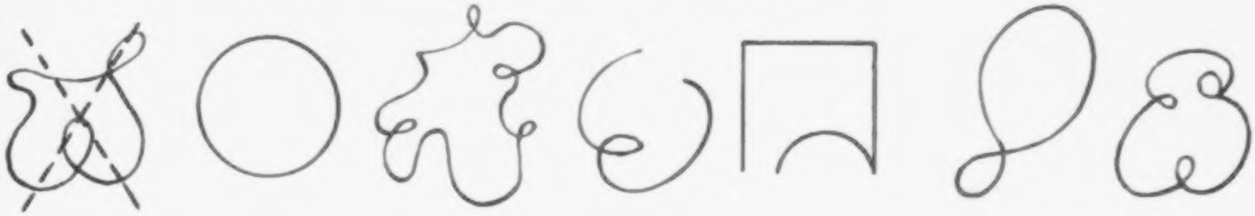
closed ________ ________ ________ ________ ________

Draw some open curves.

Draw some closed curves.



Write an X on each complex closed curve.



Draw a complex closed curve in each box.

3.13.02 LOCATE INFORMATION

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.13.02.01A locate pertinent information within a chart/table to solve problems;

e.g.,

Sandwiches		Drinks	
Ham	$1.80	Juice	$.75
Salami	$1.60	Soda	$.55
Cheese	$1.45	Milk	$.50

I bought a drink and a sandwich and paid $2.20. Which drink did I buy?

3.13.02.02A locate pertinent information within a paragraph to solve problems.

e.g.,

> Judy and Sara went to the zoo. They traveled 5 miles by bus and walked 4 blocks. At the zoo they saw many interesting animals; 3 tigers, 3 lions, 4 ducks, and an elephant. They each bought lunch for $1.15.
>
> How many 4 legged animals did they see?
>
> How much money did the girls spend altogether?

3.13.02

VOCABULARY

TERMS

historical events

bicentennial

GETTING STARTED 1:

Prepare and display cards, each with a list of recent historical events and dates.

e.g.,

Space Shuttle explodes - April, 1986

President Reagan elected - November, 1980

President Reagan elected again - November, 1984

President Carter elected - November, 1976

United States Bicentennial - July 4, 1976

100th birthday of Miss Liberty - July 4, 1986

Say, "Look at this group of recent historical events. How can we make them into a chart?" (We can give them a title.) Ask the students to suggest titles and to list them on the chalkboard. Say, "What can we do next? (We can put the events in order by date and separate the events and the dates into columns.) What can we call each column?" (We can call one column EVENT and the other, DATE.) As the students respond to the questions, create an appropriate chart. Say, "If you look at the chart, there is space between events. That is so that you can fill in another important event; the day you were born. You may also fill in any other events you think are important." Ask the students to copy the chart into their notebooks and to add significant events and dates of their own.

e.g.,

GREAT EVENTS IN AMERICAN HISTORY

Event	Date
United States Bicentennial	July 4, 1976
Ronald Reagan was born	September, 1976
President Carter elected	November, 1976

GETTING STARTED 1: cont'd

When the chart is complete, say, "Which event on your chart happened first? (The Bicentennial happened first.) What is the most recent event? (The 100th birthday of the Statue of Liberty is the most recent event.) What steps did we take to make our chart? (We gave it a title. We named each column. We listed the events in the order in which they occured.) How does this help us locate information?" (The information is organized with columns and headings. This helps us to locate information easily.)

GETTING STARTED 2:

Prepare and display a chart of the world's tallest buildings.

e.g.,

THE WORLD'S TALLEST BUILDINGS

Building	City	Height(in feet)	Number of stories
Sears Tower	Chicago	1,454	110
World Trade Center	New York City	1,353	110
Empire State Building	New York City	1,250	102
Standard Oil Building	Chicago	1,136	80
Transamerica Building	San Francisco	843	60

Cover the Height and Number of Stories columns. Say, "What is the title of this chart? (This chart is called The World's Tallest Buildings.) Which city has the greatest number of tall buildings? (Chicago and New York City each have two of the world's tallest buildings.) In which city is the World Trade Center? (It is in New York City.) How many buildings are listed?" (5 buildings are listed.) Continue asking questions to elicit other information listed on the chart.

Uncover the Height column. Say, "How high is the Sears Tower? (The Sears Tower is 1,454 feet tall.) Which building is 843 feet high? (The Transamerica Building is 843 stories high.) In what order are the buildings listed?" (They are listed by height from the tallest to the shortest.) Continue to develop and extend the lesson by uncovering the fourth column.

Ask the students to create their own questions and to ask them of one another.

3.13.02

3.13.02.01 **locate pertinent information within a chart/table to solve problems**

STRATEGY 1: Prepare and display a price list.

e.g.,

Fruit By the Piece			
Apple	40¢	Watermelon (slice)	30¢
Pear	50¢	Peach	40¢
Banana	20¢	Plum	30¢
Lemon	10¢	Lime	10¢

Say, "I went to the store with one dollar. I bought 3 pieces of fruit and spent exactly 1 dollar. What 3 pieces of fruit might I have bought?" Ask the students to list the possiblities in their notebooks. Say, "What are we asked to find? (We are asked to find 3 pieces of fruit costing a total of 1 dollar.) How can we solve this problem? Accept all reasonable responses.

e.g.,

- I can subtract the cost of 1 piece of fruit, see how much money is left, and continue subtracting the cost of the other fruit until I've used up my dollar.
- I can add the cost of 3 pieces of fruit until I have a combination which equals a dollar.

Ask several students to come to the chalkboard and list 3 kinds of fruit costing a total of 1 dollar.

e.g.,

Apple	$ .40	Pear	$ .50	Watermelon	$ .30
Pear	.50	Banana	.20	Plum	.30
Lemon	.10	Plum	.30	Peach	.40
	$1.00		$1.00		$1.00

Say, "How did the chart help you solve the problem?" (The chart is organized. It lists the names of the fruit and the prices in separate columns. It is easy to read.) Extend this lesson by asking the students to find 4 pieces of fruit which total 1 dollar.

78

3.13.02

STRATEGY 2: Prepare and display the chart titled The World's Tallest Buildings as in Getting Started 2. Present the following problem:

> Every year, in New York City, there is a race called the Empire State Run-Up. People start from the first floor of the Empire State Building and race to see who gets to the top first. If Joan has already run 42 stories, how many stories does she have left to run?

Say, "What are we asked to find? (We are asked to find how many more stories Joan has to run to reach the top.) What information are we given? (We know she has already run 42 stories.) How can we use the chart to help us find the answer? (The chart tells us that the Empire State Building is 102 stories high.) How can this information help us solve the problem? (We can subtract 42 from 102.) Why would we subtract?" (We have to find the difference between 102 and 42. When we have to find the difference between two numbers, we subtract.) Ask a student to write and solve the problem on the chalkboard.

e.g.,

$$\begin{array}{r l} \overset{0}{\cancel{1}}\overset{10}{\cancel{0}}2 & \text{number of stories high} \\ -\ 42 & \text{number of stories run so far} \\ \hline 60 & \text{number of stories left to run} \end{array}$$

Repeat this procedure with problems about other buildings for which they must use the chart.

3.13.02.02 **locate pertinent information within a paragraph to solve problems**

STRATEGY 1: Prepare a paragraph for the students to read.

e.g.,

> Sally was 10 years old the last time Halley's Comet zoomed passed the earth. For 16 nights in a row, the skies were clear and she was able to watch the beautiful comet with its tail stretching across the sky. But that was many years ago.

STRATEGY 1: cont'd

Halley's Comet passes the earth only once every 76 years. This time, in 1986, she could hardly see it. She was disappointed, both for herself, and for all the children who could not see the beautiful flash of light that she enjoyed so long ago.

Write the following questions on the chalkboard:

In what year did Sally first see Halley's Comet?
How old was Sally the second time she saw the comet?

Say, "What information does the paragraph have to help us answer the first question? (The paragraph tells us that Halley's Comet passes the earth once every 76 years.) Halley's Comet passed the earth in 1986. The time before that was 76 years earlier. What year was that? How can we solve this problem?" (We can subtract 76 from 1986 and find the difference.) Ask a student to write and solve the subtraction algorithm on the chalkboard as the other students write it in their notebooks.

e.g.,

```
  1986 this year
-   76 number of years between sightings
  1910 year that Sally first saw Halley's Comet
```

Repeat this procedure to find Sally's age in 1986. The lesson can be extended by asking the students to find the year Sally was born and her age when other historical events occured.

Say, "How did we find our answers? (Accept all reasonable responses.) Was there information in the story that was not used to answer the questions?" Explain that the importance of the information varies, depending upon the question being asked.

P.O. 3.13.02.01

NAME: ______ CLASS: ______ DATE: ______

Use the chart to answer the questions.

Five American Presidents

President	Years in Office
Carter	1976 - 1980
Ford	1974 - 1976
Nixon	1968 - 1974
Johnson	1963 - 1968
Kennedy	1960 - 1963

1. For how many years was Jimmy Carter the President of the United States?

   Jimmy Carter was president of the United States for 4 years.

2. How many years passed from the beginning of John Kennedy's term to the end of Richard Nixon's term?

3. Which president was in office for the greatest number of years?

4. Who was president for the least number of years?

5. Name three presidents whose years in office, taken together, total 15 years.

P.O. 3.13.02.02

NAME: ________________________________ **CLASS:** __________ **DATE:** ________

Read the story. Answer the questions below in complete sentences.

Sue, Maryanne, Arthur, and Josh wrote a report about the continents of the Earth. Sue read 17 pages about Africa and 6 pages about Antarctica. Maryanne read 15 pages about Asia and 15 pages about Australia. Arthur read 28 pages about Europe. Josh read 14 pages about North America and 8 pages about South America. Their teacher read their report and gave them all A's.

1. Who read the fewest pages? ______________________

   ____

2. How many more pages were read about Europe than about North America? ______________________

   ____

3. About which continent were the fewest pages read? ______________________

   ____

4. How many pages did Sue, Maryanne, and Arthur read all together? ______________________

   ____

5. How many continents are there? ______________________

   ____

6. Who read a total of 30 pages? ______________________

   ____

480

3.06.03 ADDITION AND SUBTRACTION OF FRACTIONS WITH LIKE DENOMINATORS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.06.03.01B add fractions having like denominators in vertical and horizontal formats;

e.g.,

$$\begin{array}{r} \frac{5}{8} \\ + \frac{2}{8} \\ \hline \frac{7}{8} \end{array} \qquad \frac{5}{8} + \frac{2}{8} = \frac{7}{8}$$

3.06.03.02B subtract fractions having like denominators in horizontal and vertical formats;

e.g.,

$$\begin{array}{r} \frac{8}{10} \\ - \frac{3}{10} \\ \hline \frac{5}{10} \end{array} \qquad \frac{8}{10} - \frac{3}{10} = \frac{5}{10}$$

3.06.03.03B solve story problems related to skills learned in this module.

e.g.,

Trina grew $\frac{2}{4}$ of an inch in May. During the month of June she grew $\frac{1}{4}$ of an inch. How much did Trina grow in May and June?

VOCABULARY

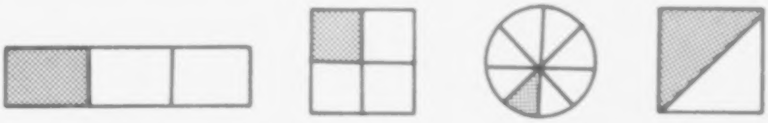
TERMS

fractions
numerator
denominator
horizontal
vertical

GETTING STARTED 1:

Draw figures on the chalkboard, each of which is divided into equal parts with 1 part shaded.

e.g.,



Point to the rectangle. Say, "Into how many equal parts is this rectangle divided? (This rectangle is divided into 3 equal parts.) What part of this rectangle is shaded?" (1 part is shaded.) What fraction is represented by the 1 shaded part?" (One-third of this rectangle is represented by the shaded part.) Ask a student to come to the chalkboard and write the fraction which represents the shaded part of the rectangle.

e.g.,

$\frac{1}{3}$

Repeat this procedure for the other figures.

Point to the circle divided into 8 equal parts. Say, "What fraction represents the shaded part of this circle?" ($\frac{1}{8}$ represents the shaded part of this circle.) On the chalkboard write: $\frac{1}{8}$. Say, "What does the bottom number represent? (It represents the number of equal parts into which the circle has been divided.) What do we call the bottom number in a fraction? (We call it the denominator.) What does the top number represent? (It represents the part about which we are thinking, the shaded part.) What do we call the top number in a fraction?" (We call it the numerator.) Display a rectangle divided into 10 equal parts.

e.g.,

4828

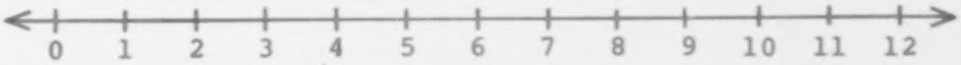
GETTING STARTED 1: cont'd

Say, "Into how many equal parts is this rectangle divided? (It is divided into 10 equal parts.) What fraction represents one of the 10 parts?" (One-tenth represents 1 of the ten parts because the rectangle has been divided into ten equal parts.)

Repeat this procedure for the other figures.

GETTING STARTED 2:

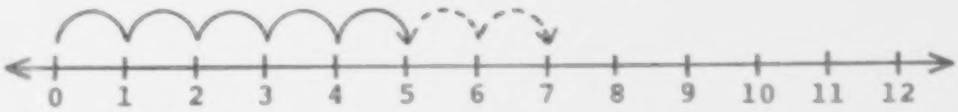
Prepare a disc. Draw a number line on the chalkboard.
e.g.,



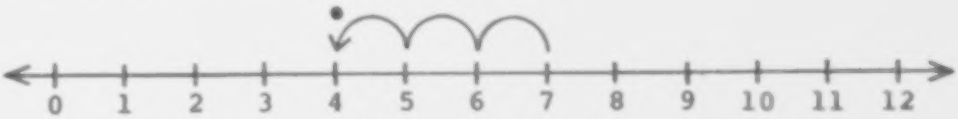
Say, "In which direction do we move on the number line when we add?" (We move from left to right when we add.) Ask a student to use his/her finger to demonstrate each move as you count from 0 through 12. Write the following problem on the chalkboard:

A rabbit jumps 5 spaces.
Then the rabbit jumps 2 more spaces.
He jumps 7 spaces in all.

Say, "What number sentence represents this problem?" (5 + 2 = 7)
Ask a student to demonstrate on the number line.
e.g.,



Place a disc at 7. Say, "Pretend the disc is the rabbit and it wants to hop back 3 spaces. In which direction do we move the disc to subtract?" (We move the disc from right to left to subtract.) Ask a student to demonstrate on the number line.
e.g.,



Say, "What number sentence is demonstrated by these jumps?" (7 - 3 = 4.)

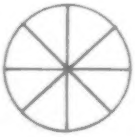
Repeat this procedure asking the students to write number sentences from the number line models and to create number line models from the number sentences.

3.06.03

3.06.03.01 **add fractions having like denominators in horizontal and vertical formats**

STRATEGY 1: Display a circle divided into eighths. Prepare colored chalk.

e.g.,



Say, "Pretend this is a pizza. Into how many equal parts is this pizza divided? (This pizza has been divided into 8 equal parts.) What is each part called?" (Each part is called one-eighth.) Ask a student to use colored chalk to shade $\frac{5}{8}$ of the figure and write $\frac{5}{8}$ on the chalkboard. Ask another student to shade $\frac{2}{8}$ of the figure and write $\frac{2}{8}$ on the chalkboard under the $\frac{5}{8}$.

e.g.,

$$\begin{array}{r} \frac{5}{8} \\ + \frac{2}{8} \\ \hline \end{array}$$

Say, "First we shaded $\frac{5}{8}$ of the pizza, then we shaded $\frac{2}{8}$ of the pizza. How many eighths were shaded in all?" ($\frac{7}{8}$ were shaded in all.) Ask a student to write the sum for $\frac{5}{8} + \frac{2}{8}$ on the chalkboard.

e.g.,

$$\begin{array}{r} \frac{5}{8} \\ + \frac{2}{8} \\ \hline \frac{7}{8} \end{array}$$

Ask another student to write this addition algorithm in horizontal format, e.g., $\frac{5}{8} + \frac{2}{8} = \frac{7}{8}$. Ask the students to copy both formats into their notebooks.

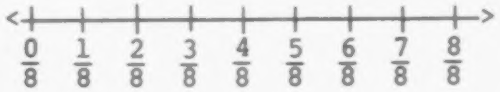
Say, "Why do we add only the numerators? (We are adding eighths. No matter how many eighths we add, they are still eighths.) Yes, just as when we add 5 peaches and 2 peaches we are adding only peaches."

Repeat this procedure with other fractions having like denominators.

3.06.03

STRATEGY 2: Draw a fractional number line on the chalkboard.

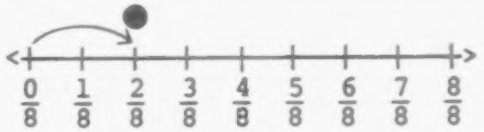
e.g.,


$\frac{0}{8}$
$\frac{1}{8}$
$\frac{2}{8}$
$\frac{3}{8}$
$\frac{4}{8}$
$\frac{5}{8}$
$\frac{6}{8}$
$\frac{7}{8}$
$\frac{8}{8}$

Say, "This is a fractional number line. We use it the same way as we use a number line with whole numbers. In which direction do we move when adding? ... when subtracting?" (When adding we move to the right. When subtracting we move to the left.)

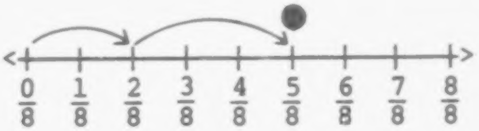
Place a disc at $\frac{0}{8}$. Say, "I want to add or jump two more spaces. In which direction should I move the disc? (Move the disc two spaces to the right.) Where should I place the disc?" (Place the disc at $\frac{2}{8}$.) Demonstrate.

e.g.,


$\frac{0}{8}$
$\frac{1}{8}$
$\frac{2}{8}$
$\frac{3}{8}$
$\frac{4}{8}$
$\frac{5}{8}$
$\frac{6}{8}$
$\frac{7}{8}$
$\frac{8}{8}$

Ask a student to come to the chalkboard and add or jump three more spaces.

e.g.,


$\frac{0}{8}$
$\frac{1}{8}$
$\frac{2}{8}$
$\frac{3}{8}$
$\frac{4}{8}$
$\frac{5}{8}$
$\frac{6}{8}$
$\frac{7}{8}$
$\frac{8}{8}$

Say, "What number sentence is represented by the jumps on the number line?" ($\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$.)

Ask a student to write $\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$ on the chalkboard in both horizonal and vertical formats as the other students write them in their notebooks.

e.g.,

$$\frac{2}{8} + \frac{3}{8} = \frac{5}{8} \qquad \begin{array}{r} \frac{2}{8} \\ + \frac{3}{8} \\ \hline \frac{5}{8} \end{array}$$

Say, "Use the number line to explain why you add only the numerators and not the denominators."

STRATEGY 2: cont'd Repeat this procedure with other groups of fractions having like denominators whose sum is less than 1.

3.06.03.02 subtract fractions having like denominators in vertical and horizontal formats

STRATEGY 1: Adapt Strategy 1, P.O. 3.06.03.01 (p. 51S.1).

STRATEGY 2: Adapt Strategy 2, P.O. 3.06.03.01 (p. 51S.2). **Note:** For subtraction, the jumps on the number line should go from right to left.

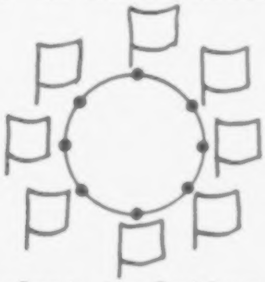
3.06.03.03 solve story problems related to skills learned in this module

STRATEGY 1: Write the following problem on the chalkboard:

> Our summer camp has a one mile track shaped like a circle. It has eight flags, lettered A through H, spaced equally around it. Yesterday I began at flag A and ran to flag B. I rested. Then I ran to flag D. If the distance between 2 flags is $\frac{1}{8}$ of a mile, how far did I run?

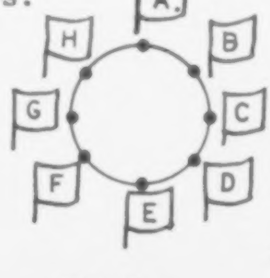
Draw a circle on the chalkboard with dots designating the $\frac{8}{8}$ of the track. Ask a student to draw the flags at each dot as the other students draw the track, dots, and flags in their notebooks.

e.g.,



Ask another student to letter the flags consecutively from A through H as the other students do the same in their notebooks.

e.g.,



88

STRATEGY 1: cont'd

Say, "Into how many parts have we divided the 1-mile track? (It has been divided into 8 parts.) What can we call each part?" (Each part can be called one-eighth of a mile.)

If you run from flag A to flag B, how far would you run? (I would run one-eighth of a mile.) Then if you run to flag D, how much farther would you run? (I would run two-eighths of a mile farther.) Running from flag A to flag D how far would you run in all? (I would run three-eighths of a mile.) What number sentence represents this problem?" ($\frac{1}{8} + \frac{2}{8} = \frac{3}{8}$) Ask a student to write $\frac{1}{8} + \frac{2}{8} = \frac{3}{8}$ on the chalkboard in both horizontal and vertical formats as the other students copy them into their notebooks.

e.g.,

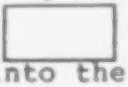
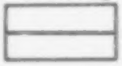
$$\frac{1}{8} + \frac{2}{8} = \frac{3}{8} \qquad \begin{array}{r} \frac{1}{8} \\ + \frac{2}{8} \\ \hline \frac{3}{8} \end{array}$$

Say, "What helped us understand and solve the problem?" (Our picture of the track and its flags helped us to understand and solve the problem more easily.)

Repeat this procedure using other distances run on the track.

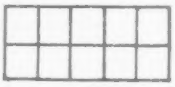
STRATEGY 2: Write the following problem on the chalkboard:

> Mother baked a rectangular cake. She cut it into 10 equal pieces. When I arrived home from school I ate 3 pieces. What fractional part of the cake was left for my brothers and sisters?

Draw a rectangle on the chalkboard to represent the cake, e.g.,  . Ask the students to copy the rectangle into their notebooks. Draw a horizontal line across the center of the rectangle and ask the students to do the same, e.g.,  . Say, "Into

STRATEGY 2: cont'd

how many parts is the cake now divided. (It is divided into 2 parts.) Into how many equal parts did mother cut the cake?" (She cut it into 10 equal parts.) Ask a student to come to the chalkboard and demonstrate how to divide the cake into 10 equal parts. Assist the student if necessary. Ask the other students to do the same in their notebooks, e.g.,



Say, "How many pieces of cake did I eat? (I ate 3 pieces of cake.) What fraction represents 3 pieces of cake?" (The fraction $\frac{3}{10}$ represents 3 pieces of cake.)

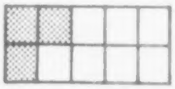
How can we find out how much was left for my brothers and sisters? (We can subtract.) Why do we subtract?" (When we take away something, we will have less than we started with. Therefore we subtract.) Ask a student to write the subtraction algorithm for this problem on the chalkboard in both horizontal and vertical formats as the other students copy them into their notebooks.

e.g.,

$$\frac{10}{10} - \frac{3}{10} = \frac{7}{10} \qquad \begin{array}{r} \frac{10}{10} \\ -\ \frac{3}{10} \\ \hline \frac{7}{10} \end{array}$$

Ask a student to come to the chalkboard and draw a picture to demonstrate this problem. Assist if necessary.

e.g.,



Say, "What part of the cake is left? (Seven-tenths of the cake is left.) How is this shown on the drawing?" (The 3 pieces of cake that were eaten are filled in. The 7 remaining pieces are blank.)

Repeat this procedure using other examples.

P.O. 3.06.03.01 & .03

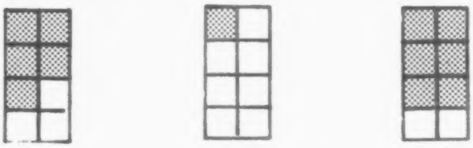
NAME: ______________________ CLASS: __________ DATE: ________

Complete the examples and solve the problems below.

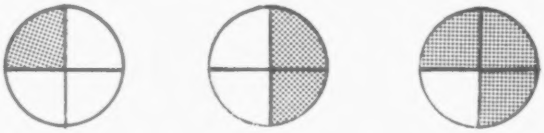
Use the words in the word box to complete the sentences.

- numerator
- denominator
- sum

When adding fractions with a common denominator, add the ____________. Then write the ____________ over the ____________.



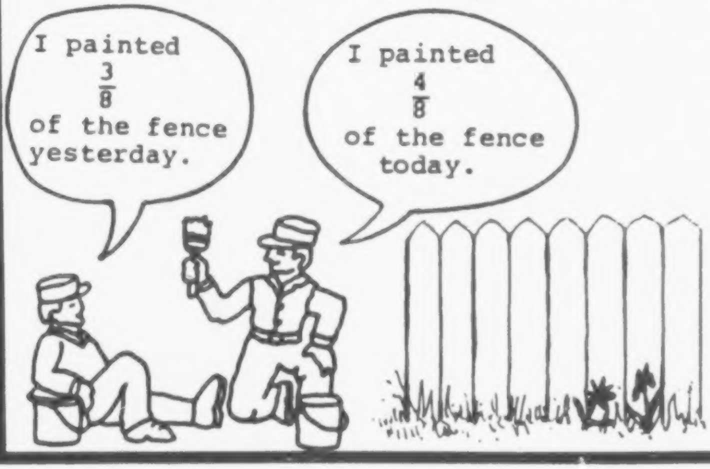
$\frac{5}{8} + \frac{1}{8} = \frac{6}{8}$



☐ + ☐ = ☐

$$\begin{array}{r} \frac{1}{5} \\ + \frac{2}{5} \\ \hline \end{array} \quad \begin{array}{r} \frac{3}{8} \\ + \frac{2}{8} \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{6} \\ + \frac{1}{6} \\ \hline \end{array} \quad \begin{array}{r} \frac{2}{4} \\ + \frac{1}{4} \\ \hline \end{array} \quad \begin{array}{r} \frac{2}{5} \\ + \frac{2}{5} \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{3} \\ + \frac{1}{3} \\ \hline \end{array} \quad \begin{array}{r} \frac{6}{8} \\ + \frac{1}{8} \\ \hline \end{array}$$

Use the picture to help you solve the problems.


I painted $\frac{3}{8}$ of the fence yesterday.
I painted $\frac{4}{8}$ of the fence today.

Write a number story to show how much of the fence was painted. ____________

____

____

How much of the fence still needs to be painted?

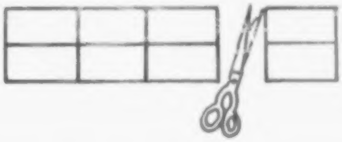
____

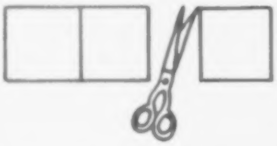
P.O. 3.06.03.01-.03

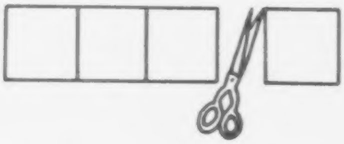
NAME:______________________________ CLASS:________ DATE:________

Follow the directions below.

Complete the examples.





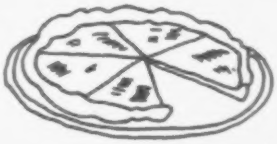


$\frac{8}{8} - \frac{2}{8} = \frac{6}{8}$ $\qquad$ $\frac{3}{3} - \frac{1}{3} = \square$ $\qquad$ $\frac{4}{4} - \frac{1}{4} = \square$

$$\begin{array}{r} \frac{5}{6} \\ -\frac{2}{6} \\ \hline \end{array} \qquad \begin{array}{r} \frac{2}{5} \\ -\frac{1}{5} \\ \hline \end{array} \qquad \begin{array}{r} \frac{5}{8} \\ +\frac{1}{8} \\ \hline \end{array} \qquad \begin{array}{r} \frac{4}{4} \\ -\frac{2}{4} \\ \hline \end{array} \qquad \begin{array}{r} \frac{3}{8} \\ +\frac{1}{8} \\ \hline \end{array} \qquad \begin{array}{r} \frac{3}{6} \\ +\frac{2}{6} \\ \hline \end{array} \qquad \begin{array}{r} \frac{2}{3} \\ -\frac{1}{3} \\ \hline \end{array}$$

Solve the problems below.

When Meg, Rob, and I arrived at the party, some of the pizza had been eaten. What fractional part of the pie was left for us?



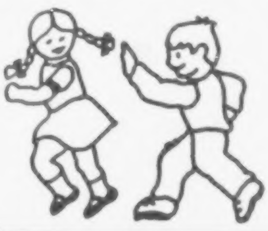
____

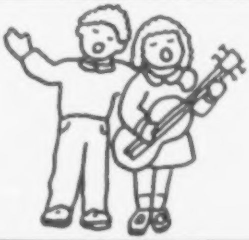
$\frac{2}{6}$ of the children were playing Pin the Tail on the Donkey.

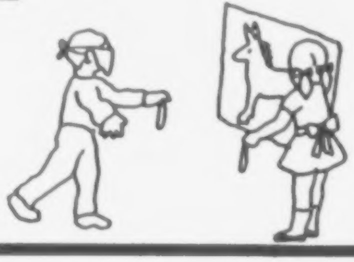
$\frac{2}{6}$ of the children were playing Tag.

$\frac{2}{6}$ of the children were singing songs.

What fractional part of the group of children were playing games? ______________________________





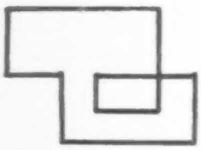


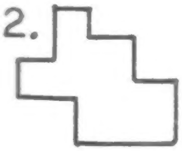
SHARPENING YOUR SKILLS

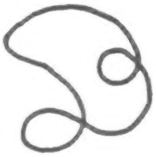
Units 42, 43,

Name: ____________________ **Class:** __________ **Date:** __________

Write the word simple or complex to describe each closed curve.

1.

____

2.

____

3.

____

Draw a complex closed curve.

4.

On July 4, 1986, over 99,000 people saw Operation Sail. One group saw 17 ships, each with 4 sails. Another group saw 19 ships, each with 12 sails. A third group saw 28 ships each with 9 sails.

5. How many ships did all 3 groups see? __________

6. How many ships had fewer than 12 sails? __________

7. How many more ships had 9 sails than 12 sails? __________

8.

$\frac{3}{8} + \frac{4}{8} = \boxed{}$

ⓐ $\frac{7}{16}$ ⓑ $\frac{1}{8}$ ⓒ $\frac{1}{16}$ ⓓ $\frac{7}{8}$

9.

$$\begin{array}{r} \frac{3}{6} \\ -\ \frac{2}{6} \\ \hline \end{array}$$

ⓔ $\frac{1}{6}$ ⓖ $\frac{6}{6}$

ⓕ $\frac{5}{6}$ ⓗ Not Here

10. Complete each example.

$\frac{1}{3} + \frac{1}{3} = \boxed{}$

$\frac{3}{4} - \frac{1}{4} = \boxed{}$

11. Jessica spent 10 minutes walking $\frac{2}{5}$ of the way toward Miss Liberty's crown. Then she slowed down and spent 15 minutes walking another $\frac{2}{5}$ of the way.

How far did she get in 25 minutes?

Unit 45

3.07.02 ADDITION AND SUBTRACTION OF DECIMALS TO TENTHS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.07.02.01B add decimals in horizontal and vertical formats without regrouping (exchange);

e.g.,

$$\begin{array}{r} 0.3 \\ +0.1 \\ \hline 0.4 \end{array} \qquad 0.3 + 0.1 = 0.4$$

3.07.02.02B subtract decimals in horizontal and vertical formats without regrouping (exchange);

e.g.,

$$\begin{array}{r} 0.7 \\ -0.2 \\ \hline 0.5 \end{array} \qquad 0.7 - 0.2 = 0.5$$

3.07.02.03B solve word problems related to skills learned in this module.

e.g.,

Alan rode his bike 0.2 miles on Monday and 0.6 miles on Tuesday. How many miles did he travel?

VOCABULARY

TERMS	SYMBOLS
decimal tenth	

GETTING STARTED 1:

Prepare groups of index cards with decimals (tenths) and equivalent fractions.

e.g., $\boxed{0.6}$ $\boxed{\frac{6}{10}}$

Distribute the groups of index cards to pairs or groups of students. Use these cards to play Concentration. Say, "Place your cards face down on your desk in rows. Select two cards. If the cards match in value, keep the pair and pick again. If the cards don't match, replace the cards face down. The next person may try for a match. The person with the most matching pairs is the winner." Ask a student to read a pair of matching cards, e.g., 0.3 and $\frac{3}{10}$. Say, "How are they similar? (They have the same value.) How are they different?" (They are written differently; one is a decimal and the other is a fraction.)

GETTING STARTED 2:

Prepare sheets of paper. On the chalk ledge display the index cards described in Getting Started 1. Hold up a fraction card. Ask a student to read the card and locate its decimal equivalent. Repeat this procedure for all the decimal and fractional equivalents. Distribute sheets of paper. Ask the students to fold the paper into 16 boxes. Say, "In each of the 16 boxes write one of the decimals or fractions displayed on the chalk ledge." Shuffle the index cards. At random, select a card. Ask a student to read its value, e.g., six-tenths. Say, "On your game sheet cross out either the fraction or the decimal which equals six-tenths. The first student to cross out four values in a row, in any direction, is the winner."

3.07.02

3.07.02.01 **add decimals in horizontal and vertical formats without regrouping (exchange)**

STRATEGY 1: Place the following examples on the chalkboard:

$$\frac{1}{10} + \frac{2}{10} = \square \qquad \begin{array}{r} \frac{1}{10} \\ + \frac{2}{10} \\ \hline \square \end{array}$$

Say, "What is the same about $\frac{1}{10}$ and $\frac{3}{10}$? ($\frac{1}{10}$ and $\frac{3}{10}$ have the same denominators.) When fractions have the same denominators we say they have a common denominator." Ask a student to add both examples. Ask another student to explain the addition as the other students write the sums in their notebooks, e.g., When I add fractions that have a common denominator, I add the numerators and use the same denominator. Say, "What is another way to write the fractions in these examples?" (The fractions can be written as decimals.) Ask a student to come to the chalkboard and write the decimal equivalents below or beside the fractional equivalents as the other students write them in their notebooks.

e.g.,

$$\begin{array}{c} \frac{1}{10} + \frac{2}{10} = \frac{3}{10} \\ 0.1 + 0.2 = 0.3 \end{array} \qquad \begin{array}{rcr} \frac{1}{10} & = & 0.1 \\ + \frac{2}{10} & = & \underline{+0.2} \\ \frac{3}{10} & = & 0.3 \end{array}$$

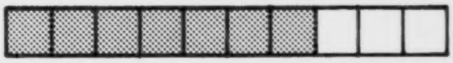
Say, "How are adding fractions and adding decimals the same? (When adding fractions with common denominators, we add the numerators to get the total. When adding decimals, we add the digits to the right of the decimal point to get the total. Both are added as if they were whole numbers.) How is the addition different for each?" (When adding fractions with a common denominator we write that denominator in the sum. When adding decimals, we place the decimal point in the sum.)

3.07.02

3.07.02.02 **subtract decimals in horizontal and vertical formats without regrouping (exchange)**

STRATEGY 1: Prepare and distribute a tens strip and scissors to each student or group of students. Say, "How many sections are on your strip? (There are ten sections on my strip.) What can we call each section? (Each section can be called one-tenth.) What can we call the whole strip? (The whole strip can be called ten-tenths or one whole.) Shade seven sections. What part of your strip did you shade? (Seven-tenths were shaded.) How many unshaded tenths are there?" (There are three unshaded tenths.) Draw an illustration of the strip on the chalkboard.

e.g.,



Say, "Use your scissors to cut 2 of the shaded tenths from the strip. Say, "With how many shaded tenths did we start? (We started with seven-tenths.) How many shaded tenths did we cut away? (We cut away two-tenths.) How many shaded tenths are left?" (There are five shaded tenths left.) Ask a student to write a number sentence on the chalkboard in decimal notation in both horizontal and vertical formats which represents this experience as the other students write them in their notebooks.

e.g.,

$$0.7 - 0.2 = 0.5 \qquad \begin{array}{r} 0.7 \\ \underline{-0.2} \\ 0.5 \end{array}$$

Repeat this procedure by subtracting one-tenth from the shaded five-tenths which are left.

Note: Prepare tens strips on duplicating paper to avoid damage to regular squared material.

3.07.02

3.07.02.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare and display the following chart:

How many miles did we run in 5 minutes?			
Ron	0.8	Susan	0.2
John	0.5	Edith	0.3
Harry	0.4	Veronica	0.7

Display the following problem:

> Some students in Mrs. Smith's class are testing their running skills. What is the difference in the distance that Ron and Susan ran in 5 minutes?

Say, "Where can we find the information to help us solve the problem? (We can use the chart.) What clue in the problem helps us decide how to solve the problem? (The word difference tells us to subtract.) What numbers will we subtract?" (We will subtract two-tenths from eight-tenths.) Ask a student to write and solve the appropriate algorithm for the problem on the chalkboard as the other students solve it in their notebooks.

e.g.,

0.8 mile	This is Ron's distance.
$\underline{-0.2}$ mile	This is Susan's distance.
0.6 mile	This is the difference between Ron's and Susan's distances.

Check the students' understanding by asking them to verbalize the problem, e.g., Ron ran eight-tenths mile. Susan ran two-tenths mile. The difference between Ron's and Susan's distances is six-tenths mile.

Repeat this procedure using the chart to create word problems which require addition or subtraction of tenths without exchange.

STRATEGY 2: Prepare 2 strips of ribbon; one strip 0.5 meter long and another strip 0.3 meter long. Display the following problem:

> Mary is building a model house. She needs 0.8 meters of ribbon to trim the windows. She has only 0.3 meters of ribbon. How much more ribbon will she need?

Display the ribbon which is 0.3 meters. Say, "Here is the ribbon Mary has. How long is it? (It is 0.3 meters long.) Does she have enough ribbon? Explain. (No, she needs 0.8 of a meter.) How can we determine how much more ribbon is needed?" Accept all reasonable responses.

e.g.,

- We can count up from 3 to 5.
- We can subtract three-tenths from eight-tenths to find the difference.
- We can use a tens strip and cut away two-tenths so eight-tenths are left. Then we can shade three-tenths of the eight-tenths and see how many unshaded tenths there are.

Ask a student to come to the chalkboard and write and label an algorithm in vertical format which represents this problem.

e.g.,

0.8 amount of ribbon Mary needs in all
- 0.3 amount of ribbon Mary has
0.5 amount of ribbon Mary must get

Ask the other students to copy this into their notebooks.

Repeat this procedure with other word problems.

P.O. 3.07.02.01 & 03

NAME: ______ **CLASS:** ______ **DATE:** ______

Follow the directions below.

Draw a line from each decimal to its equivalent fraction.

0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
$\frac{3}{10}$	$\frac{6}{10}$	$\frac{1}{10}$	$\frac{5}{10}$	$\frac{9}{10}$	$\frac{2}{10}$	$\frac{4}{10}$	$\frac{8}{10}$	$\frac{7}{10}$

Solve the following examples.

$$\begin{array}{r} 0.2 \\ +\ 0.4 \\ \hline \square \end{array} \qquad \begin{array}{r} \square \\ +\ 0.2 \\ \hline 0.7 \end{array} \qquad \begin{array}{r} 0.6 \\ +\ \square \\ \hline 0.9 \end{array}$$

$0.2 + 0.3 = \square$

$\square + 0.6 = 0.8$

$0.4 + \square = 0.7$

Solve each problem.

During the first week of April there were 0.3 inches of rain. The second and third weeks had a total of 0.4 inches of rain. How much rainfall was there during the first 3 weeks in April?

There were _____ inches of rain during the first 3 weeks of April.

The students in the science class measured the growth of tulip bulbs in the school garden. Some bulbs grew 0.4 inches in the first week of April and 0.5 inches in the second week of April. How tall did these bulbs grow in 2 weeks?

They grew _____ inches in 2 weeks.

P.O. 3.07.02.02-.03

NAME: ____________________ **CLASS:** ________ **DATE:** ________

Follow the directions below.

Solve the examples. Rewrite them in vertical format.

0.4 - 0.2 = ☐

$$\begin{array}{r} 0.4 \\ -\ 0.2 \\ \hline 0.2 \end{array}$$

0.5 - 0.3 = ☐

$$\begin{array}{r} \square \\ -\ \square \\ \hline \square \end{array}$$

0.6 - 0.1 = ☐

$$\begin{array}{r} \square \\ -\ \square \\ \hline \square \end{array}$$

0.7 - 0.3 = ☐

$$\begin{array}{r} \square \\ -\ \square \\ \hline \square \end{array}$$

0.9 - 0.6 = ☐

$$\begin{array}{r} \square \\ -\ \square \\ \hline \square \end{array}$$

0.8 - 0.5 = ☐

$$\begin{array}{r} \square \\ -\ \square \\ \hline \square \end{array}$$

Solve each problem.

Howard and Joel built ant farms in jars. Howard filled 0.9 inches of his jar with sand. Joel filled 0.6 inches of his jar with sand. How much more sand was in Howard's jar?

Howard's jar had ______ more inches of sand.

solve

The gas tanks in Ellen's and Shari's cars are almost filled to the top. Ellen needs 0.8 gallons more. Shari needs 0.5 gallons more. How much less does Shari need?

Shari needs ______ gallons less than Ellen.

solve

CHALLENGE!

$$\begin{array}{r} 8.9 \\ -\ 2.7 \\ \hline \end{array} \qquad \begin{array}{r} 9.2 \\ -\ 3.1 \\ \hline \end{array} \qquad \begin{array}{r} 11.6 \\ +\ \ .3 \\ \hline \end{array} \qquad \begin{array}{r} 5.2 \\ +\ 2.8 \\ \hline \end{array} \qquad \begin{array}{r} 15.2 \\ -\ 3.6 \\ \hline \end{array}$$

3.12.02 PROBABILITY

(2 lessons)

PERFORMANCE OBJECTIVES

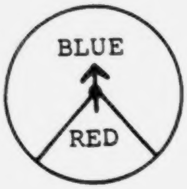
The student will be able to...

*3.12.02.01A predict the outcomes of equally likely events, and compare the results with the predictions;
e.g.,

> Predict the number of heads that will turn up if you flip a coin 100 times.

3.12.02.02A predict the outcome of unequally likely events.
e.g.,

> Predict the number of times blue will come up if we spin the spinner 12 times.



3.12.02

VOCABULARY

TERMS

predict
prediction
trial
likely
more likely
less likely
possible
impossible
certain
uncertain
equally likely
tally

GETTING STARTED 1:

Divide the students into pairs. Prepare and distribute one coin and a sheet of paper to each pair of students. Ask the students to write the headings, Heads and Tails, on the paper and number it from 1 through 30. Demonstrate.

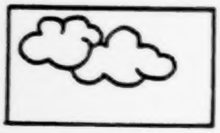
e.g.,

Heads	Tails
1.	
2.	
3.	
. . .	
30.	

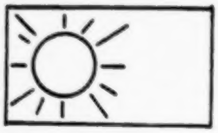
Say, "You and your partner will be taking turns tossing the coin. Record your results by placing a check (✓) in the appropriate column each time the coin is tossed." At the completion of the trials (tosses), ask the students to count the number of checks in each column and to write the total below each column. Say, "How are the results of the trials the same? (Each pair tossed some heads and some tails.) "How are the results of the trials different? (Some pairs tossed more heads than tails while others tossed more tails than heads.) Is it possible to toss all heads or all tails?" (It is possible to toss all heads or all tails, but it is unlikely. You are more likely to toss some heads and some tails.) Ask the students to discuss and compare the results using data from all the charts.

GETTING STARTED 2:

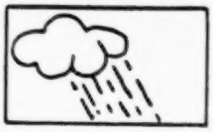
Prepare and display a group of picture cards which illustrate various weather conditions, e.g., rainy, cloudy, sunny and snowy days.
e.g.,



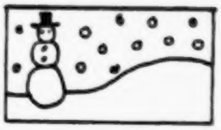
cloudy



sunny



rainy



snowy

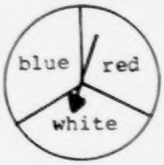
Point to the picture of clouds and say, "Here is a picture of a cloudy day. Which card shows the weather that is most likely to occur next? The card showing rain is most likely to occur next.) Why did you select that picture?" (I selected the rainy day picture because the first picture showed rain clouds.) Repeat this procedure with each picture. Say, "We have made a prediction just as the weather man makes weather predictions. What kind of weather is it this morning? (It is sunny.) What do you predict that the weather will be this afternoon? (It will probably be sunny.) How do you know? (I looked out the window and there are no clouds in the sky.) Can you be sure that it will be sunny? (No, it will probably be sunny, but I cannot be certain until this afternoon.) Can you be certain about tonight's weather or tomorrow's weather?" (I cannot be certain. It is possible that it will be clear but it may rain or snow.)

3.12.02

3.12.02.01 **predict the outcome of equally likely events and compare the results with the predictions**

STRATEGY 1: Prepare a spinner divided into 3 equal parts.

e.g.,



Say, "Let's describe the spinner. How many parts does it have? (It has 3 parts.) What are its colors? (Its colors are red, white, and blue.) How does the size of one part compare with another? (The parts are equal in size.) If we spin the spinner, toward which color is it most likely to point? (Since there are 3 colors of equal size it has an equal chance of pointing to any of the colors.) We can say that the spinner is equally likely to point to red, to white, or to blue." Allow for different predictions and ask the students to explain their predictions. Elicit that favorite colors will not influence the outcomes while an unbalanced spinner will. Display a chart.

e.g.,

Spinning a Spinner		
Color	Prediction	Outcome
Red		
White		
Blue		

Ask 3 students to predict and write the number of times the spinner will point to each color if we spin the spinner 30 times. Say, "The total for our prediction cannot be more than 30 since we will have only 30 trials." Ask a student to tally the outcomes in the tally column each time the spinner is spun. Pass the spinner among the students until there have

STRATEGY 1: cont'd

been 30 trials. Ask a student to total the tallies and write the totals in the outcome boxes.

e.g.,

Spinning a Spinner		
Color	Prediction	Outcome
Red	10	卌 卌 卌 15
White	10	卌 // 7
Blue	10	卌 /// 8

Say, "What are the differences between our predictions and our outcomes? (For red the difference is 5, for white the difference is 3, and for blue the difference is 2.) Why weren't the outcomes equal to the predictions if the size of the parts on the spinner are equal?" Accept all reasonable responses.

e.g.,

- Spinning a spinner involves chance.
- It was possible that they would be equal but not certain.
- It was likely or probable that they would be equal but not definite.

Say, "What might happen if we spin the spinner a hundred times? (We would probably come closer to our prediction because we would have more trials.) Yes, the greater the number of trials, the greater the chance that our prediction will match our outcome."

Note: This strategy will work equally well with a red, a white and a blue disc or cube placed in a paper bag. In this case, the disc or cube would be picked without looking at the color. It would then be returned to the bag and another student would pick. A tally chart would be used and predictions and outcomes compared.

3.12.02

3.12.02.02 **predict the outcome of unequally likely events**

STRATEGY 1: Prepare a bag containing 4 blue discs and 1 red disc. Say, "This bag contains red and blue discs. Can you predict the number of times we will pick each color if we pick 25 times and return the disc each time we pick? (No, we don't know how many discs there are of each color.) If I tell you there are more blue discs than red discs, can you predict the number of times we will pick each color? (We will probably pick the blue discs more often than the red discs but I don't know the exact number of times each will be picked.) Why?" (Picking discs, like spinning a spinner, depends upon chance.) Show the students the 4 blue discs and the 1 red disc. Say, "Using the words, 'more' or 'less' can you make a prediction now?" Accept several responses and list them on the chalkboard.

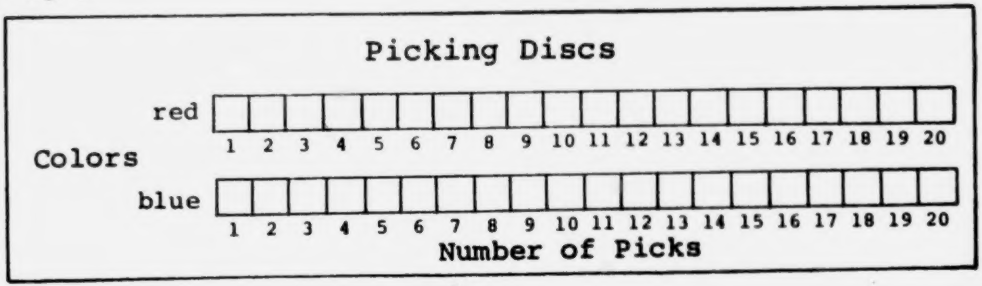
e.g.,

Predictions				
	Lisa	Todd	Keisha	Jan
Red	Less	Less	Less	More
Blue	More	More	More	Less

Say, "If the number of red and blue discs in the bag were equal, we would be predicting the outcome of equally likely events. In this case, the number of red and blue discs is unequal. Therefore we are predicting the outcome of unequally likely events."

Display a graph to be used to tally the outcomes.

e.g.,



STRATEGY 1: cont'd

Ask a student to place an X in the appropriate box each time a color is picked. After 25 picks, stop. Ask the students to compare their predictions with the outcome. Say, "Was it likely that more blue discs would be picked than red discs? Why? (It was likely that more blue discs would be picked because there are more blue discs in the bag.) Is it possible for more red discs to have been picked?" (Yes, but it was unlikely.)

Use the results on the graph to elicit responses to the following questions:

- How many picks were there in all?
- How many times was red picked?...blue?
- How many times was blue picked?

Note: This activity should be repeated either in small groups or in pairs so the students each have an opportunity to experiment with chance, to create a graph, and to develop questions pertaining to the graph.

P.O. 3.12.02.01-.02

NAME: ______________________ CLASS: ________ DATE: _______

Follow the directions below.

Predict how many times heads or tails would come up if you toss a coin 10 times.

Prediction Box

Heads	Tails

Toss a coin 10 times and tally your results.

Tally of Tosses

Heads	Tails

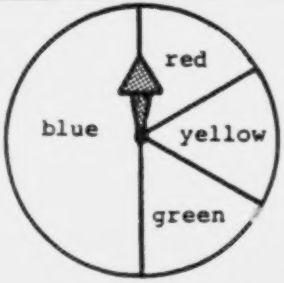
What is the difference between your prediction and your actual results? ______________________________

____

Use the words in the answer box to complete the sentences below.

Answer Box

possible
probable
predict
less likely
unlikely
impossible



1. It is ______________ to spin a blue.
2. It is ______________ to spin a yellow.
3. It is ______________ to spin a white.
4. Can you ______________ the outcome without spinning?

Unit 47

3.04.06 MULTIPLICATION OF SIXES AND SEVENS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.04.06.01A multiply six (6) by the numbers one (1) through nine (9) using vertical and horizontal formats;

e.g.,

$$\begin{array}{r} 6 \\ \underline{\times\ 1} \\ 6 \end{array} \quad \begin{array}{r} 6 \\ \underline{\times\ 2} \\ 12 \end{array} \quad \begin{array}{r} 6 \\ \underline{\times\ 3} \\ 18 \end{array}$$

$1 \times 6 = 6$
$2 \times 6 = 12$
$3 \times 6 = 18$

3.04.06.02A multiply seven (7) by the numbers one (1) through nine (9) using vertical and horizontal formats;

e.g.,

$$\begin{array}{r} 7 \\ \underline{\times\ 1} \\ 7 \end{array} \quad \begin{array}{r} 7 \\ \underline{\times\ 2} \\ 14 \end{array} \quad \begin{array}{r} 7 \\ \underline{\times\ 3} \\ 21 \end{array}$$

$1 \times 7 = 7$
$2 \times 7 = 14$
$3 \times 7 = 21$

*3.04.06.03A apply the commutative property of multiplication to the six (6) and seven (7) times table;

e.g.,

$6 \times 7 = 42$
$7 \times 6 = 42$
$6 \times 7 = 7 \times 6$

3.04.06.04A solve word problems related to skills learned in this module.

e.g.,

A room has 7 rows of desks with 6 desks in each row. How many desks are there in the room?

VOCABULARY

TERMS

multiples
factors
products
commutative property

GETTING STARTED 1:

Prepare and distribute cubes (beans, chips,...) and a placemat to each student or group of students.

Say, "Place 4 cubes in a row on your placemat. How many rows of cubes do you have? (I have one row of cubes.) How many cubes are in the row? (There are 4 cubes in the row.) How many cubes are there in all on your placemat?" (There are 4 cubes in all on my placemat.)

On the chalkboard write: 1 x 4 = 4. Ask the students to copy the number sentence into their notebooks. Say, "This sentence says one times four equals four. It means one group of 4 cubes equals 4 cubes in all. Now place another row of 4 cubes below the first row. What number sentence represents both rows of cubes?" (2 x 4 = 8) Ask a student to write 2 x 4 = 8 on the chalkboard as the other students write it in their notebooks. Say, "We can write the two sentences horizontally or vertically." Ask a student to demonstrate both methods.

e.g.,

$$\begin{array}{l} 1 \times 4 = 4 \\ 2 \times 4 = 8 \end{array} \qquad \begin{array}{r} 4 \\ \times 1 \\ \hline 4 \end{array} \qquad \begin{array}{r} 4 \\ \times 2 \\ \hline 8 \end{array}$$

Say, "Each new group of 4 cubes gives us a new answer. What do we call the answers? (They are called products.) What do we call the two numbers we are multiplying?" (They are called factors.)

Repeat this procedure for other factors and products.

3.04.06

GETTING STARTED 2:

Write the following word problem on the chalkboard:

> The third grade students will present a program about drug abuse. 5 students from each of 3 classes will perform. How many students will perform in all?

Say, "Who are we talking about? (We are talking about third grade students.) What will they do? (They will present a program about drug abuse.) How many students will perform from each class? (5 students will perform from each class.) How many classes will participate? (3 classes will participate.) What do we want to find out? (We want to find the number of students who will perform in all.) What information will help us solve this problem? (We know there are 5 students from each of 3 classes.) How would you solve the problem?" Accept all reasonable responses.
e.g.,

- I would add 5 + 5 + 5 = 15.
- I would draw 3 groups of stick figures with 5 stick figures in each group.
- I would multiply 3 x 5 = 15.

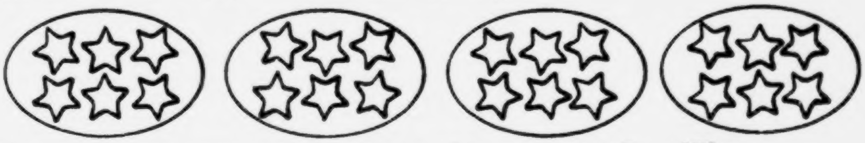
Say, "When we have many groups with the same amount in each group, how do we usually solve the problem?" (We usually multiply.)

3.04.06

3.04.06.01 **multiply six (6) by the numbers one (1) through nine (9) using vertical and horizontal formats**

STRATEGY 1: Prepare and display an illustration showing 4 groups of stars with 6 stars in each group.

e.g.,



Say, "How many groups of stars do you see? (There are 4 groups of stars.) How many stars are in each group? (There are 6 stars in each group.) Ask a student to write on the chalkboard a multiplication sentence which represents the illustration, e.g., 4 x 6 = ☐. Say, "What is another way to write this example?" (It can be written vertically as well as horizontally.) Ask the student at the chalkboard to demonstrate the vertical format, e.g., $\begin{array}{r}6\\ \underline{\times 4}\end{array}$ Say, "How can we find the answer without multiplying? (We can add 6 + 6 + 6 + 6.) What would the sum be? (The sum would be 24.) What is the product of 4 x 6? (The product of 4 x 6 is 24.) Why do we multiply rather than add?" (Multiplication is a fast way of adding equal groups.)

Repeat this procedure with other groups of 6. Ask the students to write the number sentences in their notebooks in both horizontal and vertical formats.

3.04.06.02 **multiply seven (7) by the numbers one (1) through (9) using vertical and horizontal formats**

STRATEGY 1: Prepare and display the following chart:

7 = ☐	1 x 7 = ☐
7 + 7 = ☐	2 x 7 = ☐
7 + 7 + 7 = ☐	3 x 7 = ☐
7 + 7 + 7 + 7 = ☐	4 x 7 = ☐

STRATEGY 1: cont'd

Point to the addition number sentence. Say, "Look at each example. What kind of examples are they? (They are addition examples.) What kind of number sentences are on the right? (They are multiplication number sentences.) In the multiplication sentence, $1 \times 7 = \boxed{}$, what does the 1 tell us? (The 1 tells us we have 1 group.) What does the 7 tell us?" (The 7 tells us there are 7 in each group.)

Ask several students to each complete an addition number sentence on the chalkboard while the students write and complete them in their notebooks. Say, "If 7 equals 7, 1 times 7 equals 7. If 7 plus 7 equals 14, what does 2 times 7 equal?" (2 times 7 equals 14.)

Repeat this procedure until the addition and multiplication number sentences are completed.

Say, "We have written each multiplication fact in horizontal format. How can each fact be written vertically?" Ask several students to demonstrate by writing the vertical format next to the horizontal format for each example. Ask the other students to write them into their notebooks.

e.g.,

$$7 + 7 = 14 \qquad 2 \times 7 = 14 \qquad \begin{array}{r} 7 \\ \underline{x2} \\ 14 \end{array}$$

STRATEGY 2: Prepare the following chart:

Weeks	1	2	3	4	5	6	7	8	9
Days	7	14							

Say, "How many days are there in one week? (There are 7 days in one week.) How many days are there in 2 weeks? (There are 14 days in 2 weeks.) Ask the students to copy the chart into their notebooks. Say, "If 1 week has 7 days and 2 weeks have 14 days, what number sentences can we use to describe this?" (1 x 7 = 7 and 2 x 7 = 14.) Ask a student to write

STRATEGY 2: cont'd

these number sentences, one below the other on the chalkboard, while the other students write them in their notebooks.

Repeat this procedure until the chart is completed and number sentences have been written for the multiplication facts for 7 through 9 x 7 = 63.

Say, "Which number in a horizontal multiplication number sentence tells the number of groups? (The first number tells the number of groups.) Which number tells the number in each group? (The second number tells the number in each group.) What do we call the answer? (The answer is called the product.)

e.g.,

horizontal number sentence

9	x	7	=	63
number of groups		number in each group		answer

Say, "In a vertical multiplication example, which number tells us the number of groups? (The bottom number tells us the number of groups.) What does the top number tell us? (The top number tells us how many are in each group.) Where is the product written?" (It is written below the line.)

e.g.,

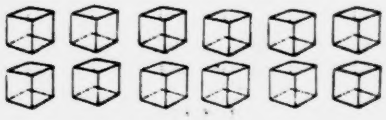
vertical number sentence

$$\begin{array}{rl} 7 & \text{number in each group} \\ \underline{\times 9} & \text{number of groups} \\ 63 & \text{answer} \end{array}$$

3.04.06.03 **apply the commutative property of multiplication to the six (6) and seven (7) times tables**

STRATEGY 1: Prepare and distribute colored cubes (beads, discs) to each student or group of students. Say, "Show 2 rows of cubes with 6 cubes in each row." Draw a representation on the chalkboard.

e.g.,



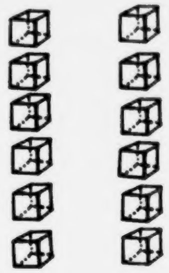
2 rows with 6 in each row.

2 x 6 = ☐

STRATEGY 1: cont'd

Say "How many cubes are shown in all? (12 cubes are shown in all.) Move these 12 cubes to one side of your desk. Now show 6 rows of cubes with 2 cubes in each row." Demonstrate with a representation on the chalkboard.

e.g.,



6 rows with 2 in each row

$6 \times 2 = \square$

Say, "How many cubes did you use this time? I used 12 cubes.) How are 6 rows with 2 in each row the same as 2 rows with 6 in each row? (They both have 12 cubes.) How are they different? (They are turned around. The first time we had 2 rows of 6. Now we have 6 rows of 2.) When we multiply the order of the factors does not change the product. What rule is this?" (This is the commutative property of multiplication.) Write several examples on the chalkboard and ask a student to solve them as the other students solve them in their notebooks.

e.g.,

$3 \times 7 = \square$

$7 \times 3 = \square$

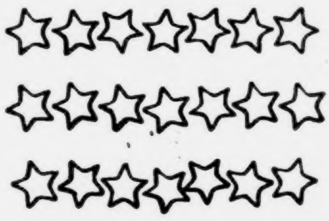
$3 \times 7 = 7 \times \square$

$3 \times \square = 7 \times 3$

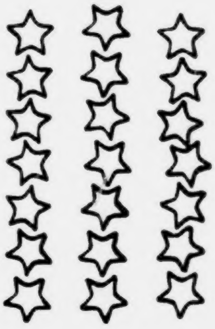
STRATEGY 2: Display two arrays which illustrate the commutative property of multiplication.

e.g.,

A



B



STRATEGY 2: cont'd

Ask the students to come to the chalkboard and write a multiplication sentence for each array.

e.g.,

$3 \times 7 = 21$

$7 \times 3 = 21$

Say, "What is the difference between A and B? (A shows 3 rows of 7. B shows 7 rows of 3.) How many stars are in A? (There are 21 stars in A.) How many stars are in B? (There are 21 stars in B.) A and B have an equal number of stars." Write 3 x 7 = 7 x 3 and several other examples on the chalkboard which illustrate the commutative property of multiplication. Ask the students to complete the examples in their notebooks as several students complete them at the chalkboard.

e.g.,

$5 \times 6 = 6 \times \square$

$2 \times \square = 7 \times 2$

$\square \times 6 = 6 \times 3$

$7 \times 8 = \square \times 7$

Say, "What do we call the numbers that we multiply? (The numbers that we multiply are called factors.) What is the product when the factors in a multiplication example are reversed? (The product is the same as before the factors were reversed.) What is this rule?" (This is the commutative property of multiplication.)

3.04.06.04 **solve word problems related to skills learned in this module**

STRATEGY 1: Display the following problem:

> Bobby looks at a calendar and sees that his birthday is exactly 6 weeks from today. How many days must he wait until his birthday arrives?

STRATEGY 1: cont'd

Say, "Which sentence in this problem asks the question? (The last sentence asks the question.) Where can we find information to help us solve the problem? (There is information in the first sentence to help us solve the problem.) What must we know to solve this problem? (We must know the number of days in 1 week and then find the number of days in 6 weeks.) What is one way to solve this problem without using a calendar?" (We can make a chart.) e.g.,

week 1 = 7 days 7
week 2 = 7 days 14
week 3 = 7 days 21
week 4 = 7 days 28
week 5 = 7 days 35
week 6 = 7 days 42

Say, "Is there another way to solve this problem?" (We can write a multiplication sentence.) Ask a student to write, label, and solve an approporiate multiplication example on the chalkboard as the other students write it in their notebooks.
e.g.,

6 weeks until Bobby's birthday
x7 days in a week
42 days until Bobby's birthday

Say, "What number represents the product?" (The product is represented by the number 42.)

STRATEGY 2: Display the following problem:

> Sarah had 6 bags with 9 pennies in each bag. Michelle had 9 bags with 6 pennies in each bag. Michelle said, "I have more pennies than you because I have 9 bags. Sarah said, "I have more pennies than you because I have 9 pennies in each bag." Who was right? How many pennies did each girl have?

STRATEGY 2: cont'd

What is being asked in this problem? (We are being asked to find which girl was right and how many pennies each girl had.) How can we solve this problem?" (We can fill bags with pennies to find the answer or we can multiply 6 x 9 and 9 x 6.

Write Sarah and Michelle on the chalkboard. Ask a student to write the appropriate multiplication sentence below each name.

e.g.,

Sarah	Michelle
6 x 9 = ☐	9 x 6 = ☐

Ask a student to solve the problem at the chalkboard while the other students solve it in their notebooks. Say, "Which girl was right? (Neither girl was right. They both had 54 pennies.) How could we have known that they had the same amount without doing the multiplication?" (We could have known by our understanding of the commutative property of multiplication. 6 x 9 = 9 x 6.)

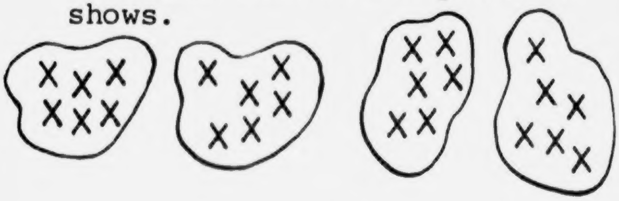
P.O. 3.04.06.01 & .04

NAME: ______________________ **CLASS:** ________ **DATE:** ________

Follow the directions below.

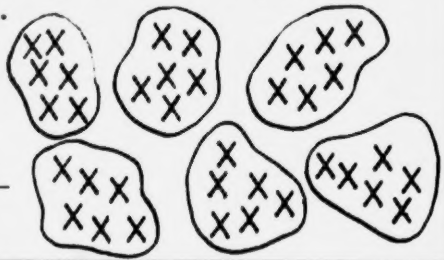
Complete the number sentences for questions 1 - 4.

1. Write the multiplication sentence which this picture shows.



____ x ____ = ____

2. Write the multiplication example which this picture shows.



____
x ____
☐

3. Write the multiplication sentence which means the same as.

6 + 6 + 6 + 6 + 6 + 6 + 6 + 6 = ☐

☐
x ☐
☐

4. Complete each example.

5 x 6 = ☐

7 x 6 = ☐

3 x 6 = ☐

6
x 1
☐

6
x 9
☐

Solve the problems below.

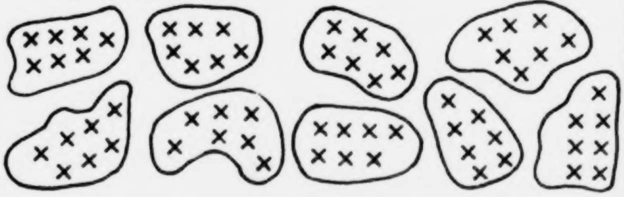
5. In Cora's building, each story is exactly 8 feet high. If there are 6 stories in the building, how high is the roof from the street? The roof is ____ feet high.	**solve**
6. On the first floor of Cora's building there are 6 apartments. Each apartment has 6 rooms. How many rooms are there on the first floor? There are ____ rooms.	**solve**
7. The Marks family has 6 daughters. The Stone family has 6 sons. The Lee family has 6 daughters. How many children are in the 3 families? There are ____ children in the 3 families.	**solve**
8. The building superintendent must repair 4 windows. Each window has 6 broken window panes. How many window panes must he replace? He must replace ____ window panes.	**solve**

P.O. 3.04.06.02&.04

NAME: ______________________ CLASS: ________ DATE: ________

Follow the directions below.

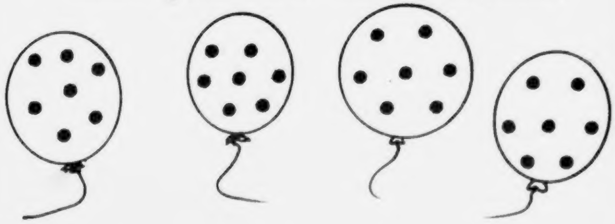
1. Write the multiplication sentence which this picture shows.



____ groups of ____ = ____

______ X ______ = ____

2. Write the example which this picture illustrates.



____ groups of ____ = ______

______ X ______ = ______

3. Write the multiplication sentence which means the same as:

7+7+7+7+7+7+7 = 49

____ X ____ = ☐

4. Complete each example.

7	7	7	7
x2	x8	x7	x5
☐	☐	☐	☐

1 x 7 = ☐

3 x 7 = ☐

Solve the problems below.

5. In Paul's Pet Shop, there are 4 bird cages. Each cage holds 7 parrots. How many parrots are there in all?

There are ______ birds in all.

solve

6. Paul sold 7 packages of bird seed on each of 6 days. How many packages did he sell?

Paul sold ______ packages.

solve

Do you remember?

Mr. Green's peach orchard in Georgia has 523 trees. Mrs. Smith's apple orchard in New York has 237 trees. Mrs. Rivera's orange orchard in Florida has 419 trees. How many more fruit trees has Mr. Green than Mrs. Rivera?

______ more fruit trees.

solve

P.O. 3.04.06.01-.03

NAME: ______________________ **CLASS:** ________ **DATE:** ________

Follow the directions below.

Complete each number sentence.

①

5 x 6 = ☐   6 x 5 = ☐

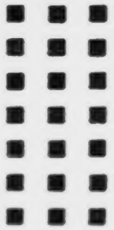
5 x 6 = 6 x ☐

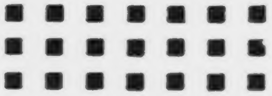
②

$$\begin{array}{r} 8 \\ \times\ 7 \\ \hline \boxed{} \end{array} \qquad \begin{array}{r} 7 \\ \times\ 8 \\ \hline \boxed{} \end{array}$$

7 x 8 = ☐ x 7

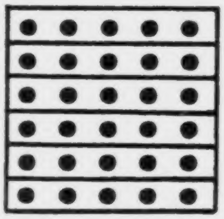
③

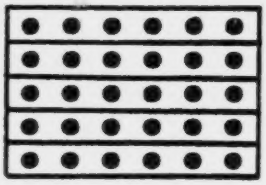




7 x ☐ = 3 x ☐

④





☐ x 5 = 5 x ☐

Solve each problem.

5. Gondolas are long, narrow boats. The lake in Central Park has gondolas which hold 6 people each. If there are 3 gondolas on the lake, each holding 6 people, how many people are riding in gondolas?

__________ people are riding in gondolas.

Solve

6. Rowboats on the lake hold 7 people each. 9 full rowboats were on the lake. How many people were in rowboats?

__________ people were in the rowboats.

Solve

CHALLENGE!

Sara pushed a gondola 5 days a week for 7 weeks.
Walter pushed a gondola 7 days a week for 5 weeks.
How many days did Sara and Walter work in all?

They worked ____________ days in all.

Solve

SHARPENING YOUR SKILLS

Units 44,45,46,47

Name:____________________ Class: ________ Date:__________

1. Which sum will make both examples true?

$$\begin{array}{r} 0.4 \\ +\ 0.3 \\ \hline \end{array} \qquad 0.4 + 0.3 = \square$$

0.1 ⓐ 0.7 ⓑ 4.3 ⓒ 7.0 ⓓ

2. Which vertical example will have the same difference as 0.9 - 0.3 = ☐

$$\begin{array}{r} 9.0 \\ -\ 3.0 \\ \hline \end{array} \qquad \begin{array}{r} 0.9 \\ +0.3 \\ \hline \end{array} \qquad \begin{array}{r} 9.0 \\ -0.3 \\ \hline \end{array} \qquad \begin{array}{r} 0.9 \\ -0.3 \\ \hline \end{array}$$

ⓔ ⓕ ⓖ ⓗ

3. During a winter storm we measured the daily snowfall. On Monday, there were 0.8 cm of snow. On Tuesday there were 0.1 cm of snow.

How much snow had fallen on Monday and Tuesday?

____

How much more snow fell on Monday than on Tuesday?

____

4. Complete each number sentence.

5 x 7 = ☐ x 5

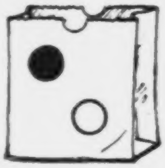
☐ x 6 = ☐ x 8

3 x 7 = 7 x ☐

5. Pretend you are tossing a coin 100 times. Which prediction would you make about the possible outcome of 100 tosses?

	Heads	Tails	Total Flips
ⓐ	100	0	100
ⓑ	0	100	100
ⓒ	50	50	100

6. Pretend you are reaching into the bag without looking and pick a marble. Replace it and repeat that 50 times. You would probably draw _____.

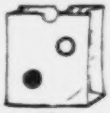


ⓓ the black marble most of the time.

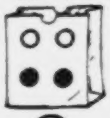
ⓔ the white marble most of the time.

ⓕ the white and black marble about the same number of times.

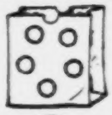
7. From which bag are you most likely to draw a black marble?



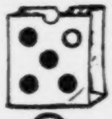
ⓐ



ⓑ



ⓒ



ⓓ

8. Julio went to the dentist for his checkup. He was asked to return in six weeks. How many days is that?

______ days.

Unit 48

3.05.04 DIVISION OF WHOLE NUMBERS FOR SIXES THROUGH 54, FOR SEVENS THROUGH 63

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.05.04.01A divide by 6 for dividends to 54 without a remainder;

e.g., check

$12 \div 6 = 2$; $\begin{array}{r} 2 \\ 6\overline{)12} \end{array}$; $6 \times 2 = 12$

$18 \div 6 = 3$; $\begin{array}{r} 3 \\ 6\overline{)18} \end{array}$; $6 \times 3 = 18$

$36 \div 6 = 6$; $\begin{array}{r} 6 \\ 6\overline{)36} \end{array}$; $6 \times 6 = 36$

3.05.04.02A divide by 7 for dividends to 63 without a remainder;

e.g., check

$63 \div 7 = 9$; $\begin{array}{r} 9 \\ 7\overline{)63} \end{array}$; $7 \times 9 = 63$

$49 \div 7 = 7$; $\begin{array}{r} 7 \\ 7\overline{)49} \end{array}$; $7 \times 7 = 49$

$35 \div 7 = 5$; $\begin{array}{r} 5 \\ 7\overline{)35} \end{array}$; $7 \times 5 = 35$

3.05.04.03A solve word problems related to skills learned in this module.

e.g.,

Marion shared 48 pencils equally among 6 friends. How many pencils did each friend receive?

VOCABULARY

TERMS

GETTING STARTED 1:

Prepare flashcards with division facts for 2,3,4,and 5, BINGO cards, and unit pieces for each student or group of students.
e.g.,

B	I	N	G	O

15 ÷ 5 = ☐

24 ÷ 4 = ☐

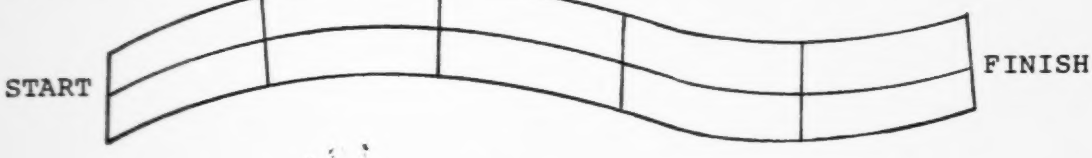
10 ÷ 2 = ☐

35 ÷ 7 = ☐

Distribute the BINGO cards and unit pieces. Ask the students to randomly fill in numbers from 1 through 8, on each card. The numbers may be repeated. Display a flashcard. Say, "We will practice our multiplication facts by playing BINGO. If you have a number on your BINGO card which is the product for this example, cover the number with a unit piece. Even if the product appears more than once on your BINGO card, you may cover it only once. The first player to cover 5 boxes horizontally, vertically, or diagonally, will call out 'BINGO'. He or she will be the winner." Repeat this procedure until there are several winners.

GETTING STARTED 2:

Prepare a drawing of a race track on the chalkboard, a yellow disc, and a blue disc.
e.g.,



GETTING STARTED 2: cont'd

Say, "There will be two teams. One of the teams will get a chance to complete a division example. If a team player answers correctly, that team's car (disc) will move ahead 1 space. If the player answers incorrectly, the other team will have a chance to answer the same question, but will move ahead two spaces for answering correctly." Ask the players to solve division examples with divisors of 2,3,4 and 5.

After each example is answered, say. "Is that answer correct? How can we be sure? How can we check?" Ask several students to take turns writing the division examples on the chalkboard and the check for each example.

e.g.,

		check
$12 \div 2 = 6$	$\begin{array}{r} 6 \\ 2\overline{)12} \end{array}$	$6 \times 2 = 12$
$21 \div 3 = 7$	$\begin{array}{r} 7 \\ 3\overline{)21} \end{array}$	$7 \times 3 = 21$
$24 \div 4 = 6$	$\begin{array}{r} 6 \\ 4\overline{)24} \end{array}$	$6 \times 4 = 24$
$15 \div 5 = 3$	$\begin{array}{r} 3 \\ 5\overline{)15} \end{array}$	$3 \times 5 = 15$

3.05.04

3.05.04.01 **divide by 6, for dividends to 54, without a remainder**

STRATEGY 1: Prepare 54 discs. Display 12 discs. Say, "Pretend that these discs are 12 delicious cookies that Karen has baked. Who would like to be Karen?" Ask a student to sit near the 'cookies'. Say, "Suddenly the doorbell rings. Alice, Bob, Cory, Sarah, and Claude arrive." Ask 5 students to be the above characters. Say, "Karen says that she was hoping someone would visit so she could share her cookies. If Karen shares the cookies equally among her friends and herself, how many cookies will each one get?"

Say, "When things are shared equally, how can we determine how many each person will get? (We can give each person the same number of things until there are none left to share or we can divide.) We will do both. Karen, please share your cookies with your friends so that each of you has an equal number of cookies." After the 'cookies' are shared ask 2 students to each write a different division example on the chalkboard which represents this problem.

e.g.,

$12 \div 6 = 2$ $\qquad$ $\begin{array}{r}2\\6\overline{)12}\end{array}$

Say, "How can we check this division?" (We can multiply the quotient and the divisor and the result should be the dividend.)

e.g.,

$6 \times 2 = 12$

Ask the students to fold a sheet of paper into 3 columns, label them, and write the division examples and the check in the appropriate columns.

e.g.,

division	division	check
$12 \div 6 = 2$	$\begin{array}{r}2\\6\overline{)12}\end{array}$	$6 \times 2 = 12$

STRATEGY 1: cont'd

Say, "I will tell you several division stories. For each story, you will write the appropriate division examples and the multiplication check." Ask several students to complete this chart at the chalkboard as the other students complete it in their notebooks. Tell stories which develop the division algorithms for 6 beginning with 6 ÷ 6 = 1 through 54 ÷ 6 = 9. Ask the students to create their own division stories.

STRATEGY 2:

Adapt Strategy 1, P.O. 3.05.03.01 (p. 46S.1), to develop division by 6 for dividends to 54 without a remainder.

3.05.04.02 **divide by 7 for dividends to 63 without a remainder**

STRATEGY 1:

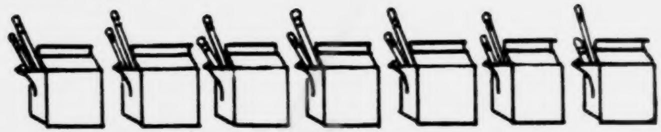
Prepare and distribute groups of 63 cubes (chips, sticks, unit squares) to each group of students. Ask one student in each group to count out 35 cubes and place them in the center of his/her table. Ask other students in the group to take cubes from that pile and make stacks of 7 cubes. Say, "How many stacks of 7 cubes did you make? (We made 5 stacks of 7 cubes.) With how many cubes did you start? (We started with 35 cubes.) When we separate a group into several equal groups, what operation do we use?" (We divide.) Ask a student to write a number sentence on the chalkboard which represents 35 cubes separated into 7 groups of 5, e.g., 35 ÷ 7 = 5. Say, "Is there another way to write 35 ÷ 7 = 5?" Ask a student to write it on the chalkboard, e.g., $\begin{array}{r}5\\7\overline{)35}\end{array}$. Ask a student to demonstrate on the chalkboard how to check a division example as the other students write the check in their notebooks, e.g., 5 x 7 = 35.

Repeat this procedure of dividing and checking until all the facts for division by 7 for dividends through 63 have been listed on the chalkboard and written in the students' notebooks.

3.05.04

STRATEGY 2: Prepare and display 14 sticks (pencils) and 7 empty milk containers. Say, "Pam has 14 pencils to share among 7 friends. Pam will not keep any pencils." Ask a student to distribute the pencils equally among the 7 milk containers. Say, "How many pencils will each friend get?

e.g.,



Elicit from the students that 14 pencils shared equally by 7 friends means each friend will get 2 pencils or that 14 divided by 7 equals 2. In how many different ways can we write this?" (We can write this in 2 different ways.) Ask a student to write the 2 formats on the chalkboard while the other students write them in their notebooks, e.g., $14 \div 7 = 2$ and $\begin{array}{r}2\\7\overline{)14}\end{array}$. Repeat this procedure, adding additional sticks (pencils), until all the division facts for 7 have been derived. After each division fact is written say, "How can we check our answer?" (We can multiply.) Ask a student to go to the chalkboard and write the appropriate multiplication sentence to check $14 \div 7 = 2$, e.g., $2 \times 7 = 14$.

3.05.04.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare a group of word problems requiring the students to divide by 6 for dividends to 54 and by 7 for dividends to 63.

e.g.,

> During the Revolutionary War, George Washington trained groups of soldiers to watch for the British. He trained 54 soldiers in all. He wanted 6 soldiers in each group. How many groups of soldiers did he train?

STRATEGY 1: cont'd

Ask the students to copy the problem into their notebooks. Say, "What does the problem ask us to find? (We must find how many groups of soldiers Washington trained.) How many soldiers did he train in all? (He trained 54 soldiers.) How many soldiers did he want in each group? (He wanted 6 in each group.) How can we solve this problem?" (We have to find how many groups of 6 we can make from 54. We can divide 54 by 6.) Ask a student to write, solve and label the example on the chalkboard as the other students write it in their notebooks.

e.g.,

$54 \div 6 = 9$

There were 9 groups of soldiers trained.

Say, "Why is the quotient smaller than the dividend?" (If we start with 54 and separate 54 into equal groups, the number of groups must be smaller than the number with which we began.)

Repeat this procedure for the other problems.

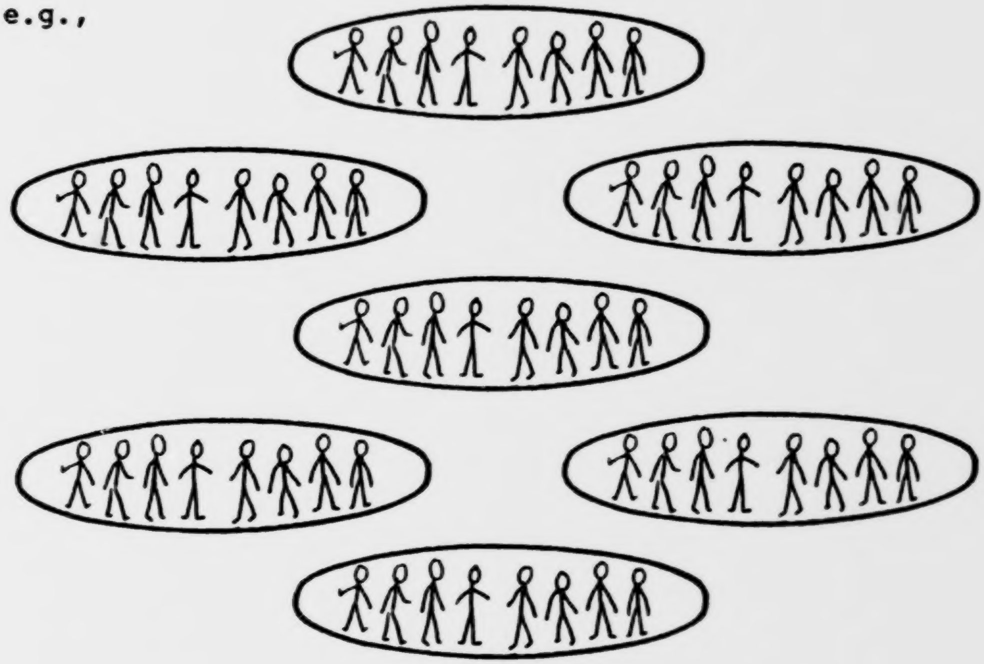
STRATEGY 2: Prepare a group of division problems for division by 6 and 7.

e.g.,

> 56 students went to the Museum of Natural History. They went with 7 adults. If each adult was responsible for an equal number of students, how many students were in each group?

Ask the students to copy the problem into their notebooks. Say, "What does the problem ask? (The problem asks us to find the number of students in each group.) How many students were there in all? (There were 56 students in all.) How many groups were there? (There were 7 groups.) How would drawing a picture help us solve the problem? (We could draw 7 circles and place an equal number of stick figures in each circle until we reach a total of 56.)

STRATEGY 2: e.g.,
cont'd



Say, "Is there another way to solve this problem?" (We could write a division example.) Ask the students to write the appropriate division example, e.g., 56 ÷ 7 = 8 or $\begin{array}{r}8\\7\overline{)56}\end{array}$. Say, "What is the answer to this problem?" (There were 8 students in each group.)

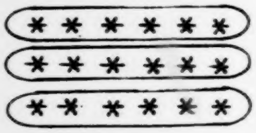
Repeat this procedure with other word problems.

P.O. 3.05.04.01 & .03

NAME:______________________________ CLASS:__________ DATE:________

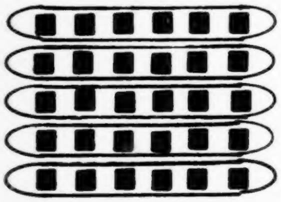
Follow the directions below.

For each array write 2 division examples.



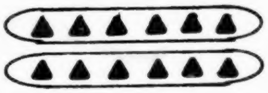
18 ÷ 6 = 3

$6\overline{)18}$ 3



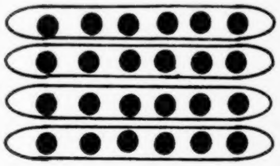
___ ÷ ___ = ___

$\overline{)}$



___ ÷ ___ = ___

$\overline{)}$



___ ÷ ___ = ___

$\overline{)}$

Solve and check.

☐ 6)6 **check**

☐ 6)12 **check**

☐ 6)36 **check**

☐ 6)24 **check**

☐ 6)30 **check**

☐ 6)18 **check**

☐ 6)42 **check**

☐ 6)48 **check**

☐ 6)54 **check**

Solve the problems.

Not too long ago, postcards cost 6¢. How many postcards could you buy for 30¢?

You could buy____________ 6¢ postcards for 30¢.

Letters always cost more to mail than postcards. If you spent 54¢ and mailed 6 letters, how much did each letter cost to mail?

Each letter cost _______ to mail.

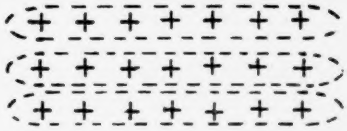
P.O. 3.05.04.02-.03

NAME:____ CLASS:________ DATE:_______

Follow the directions below.

Circle groups of 7. Write and check a division example for each.

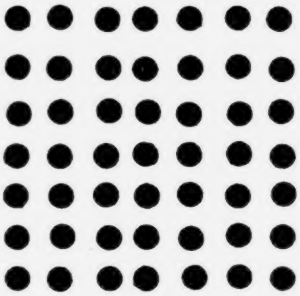
①



21 ÷ 7 = 3

3 X 7 = 21

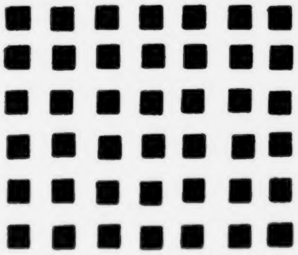
②



___ ÷ ___ = ___

___ X ___ = ___

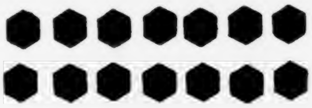
③



___ ÷ ___ = ___

___ X ___ = ___

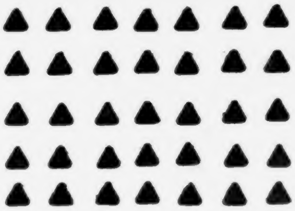
④



___ ÷ ___ = ___

___ X ___ = ___

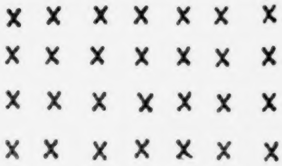
⑤



___ ÷ ___ = ___

___ X ___ = ___

⑥



___ ÷ ___ = ___

___ X ___ = ___

⑦ Solve the problem.

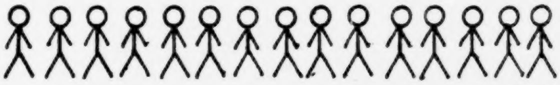
A U.S. Olympic bicycle racer trained for a total of 49 hours during the entire week before the race. If the racer trained for an equal number of hours each day, for how many hours a day was she in training?

She was in training for ____________hours a day.

Do you remember?

$\frac{4}{5}$ of the U.S. Olympic broadjump team will compete.

Draw a ring around $\frac{4}{5}$ of the team.



$\frac{4}{5}$ of 15 = ☐

Unit 49

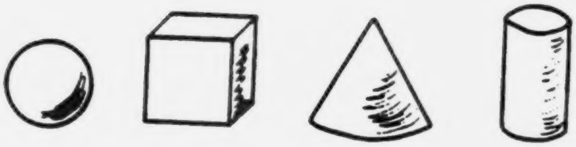
3.09.04 SOLID FIGURES

(1-2 lessons)

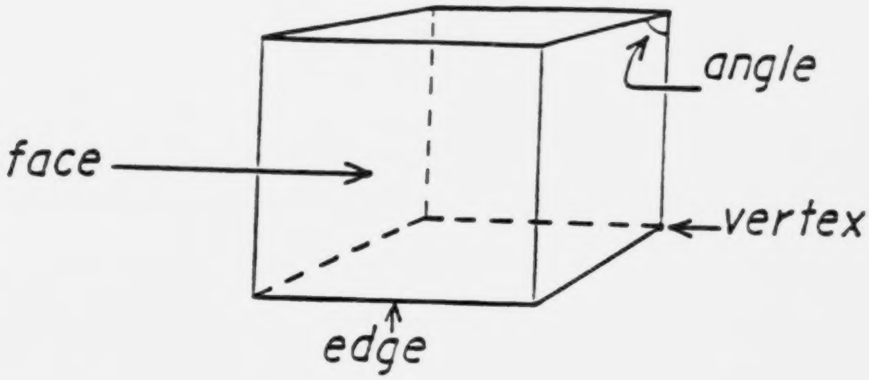
PERFORMANCE OBJECTIVES

The student will be able to...

3.09.04.01A define and identify a sphere, cube, cone, and cylinder;
e.g.,



3.09.04.02A identify the vertex, edge, line segment, angle, and face of a solid figure.
e.g.,



3.09.04

VOCABULARY

TERMS

angle
face
vertex
edge
sphere
cube
cone
cylinder
compass
protractor

GETTING STARTED 1:

Prepare and distribute to each student or group of students shapes or attribute pieces, including one square, one rectangle, one triangle, and one circle.

Ask each student to choose a shape. Say, "Touch a corner of your shape. Does anyone have a shape with no corners? How many corners does your shape have? Touch the sides of your shape. How many sides does your shape have?" Ask the students to choose a different shape. Repeat the above questions for the new shapes. As the students respond, complete the chart below.

e.g.,

Let's Describe Shapes

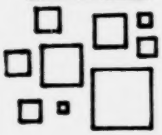
square	rectangle	triangle	circle
• 4 corners	• 4 corners	• 3 corners	• no corners
• 4 angles	• 4 angles	• 3 angles	• no angles
• 4 equal sides	• opposite sides are equal	• 3 sides	• round

GETTING STARTED 2:

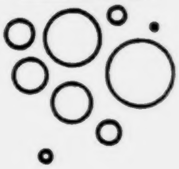
Prepare and distribute to each student or group of students glue, a sheet of construction paper, and an envelope containing either paper triangles, rectangles, circles, or squares. Each envelope should contain only one shape, but in many different sizes.

e.g.,

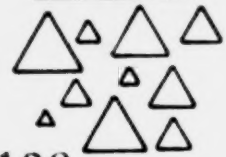
squares



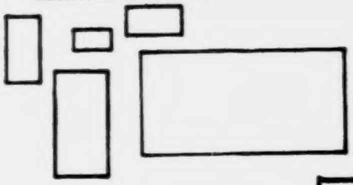
circles



triangles



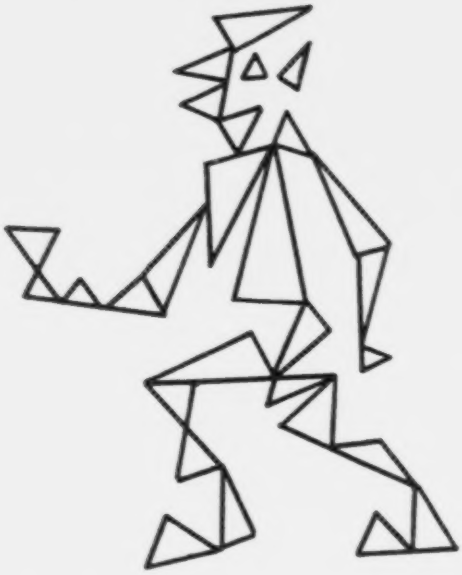
rectangles



GETTING STARTED: 2 cont'd

Say, "Your envelope contains one shape in many sizes. Fold your construction paper in half. You will arrange your shapes on one half of the construction paper so that you create a figure." Demonstrate. e.g.,

Mr. Triangle



Say, "When you are finished, glue the shapes to the paper. On the blank half of your paper write a description of your shape, e.g., A triangle has 3 sides and 3 corners or angles. Sometimes all the sides are equal, sometimes they are not."

Display the students' work and ask them to read the descriptions of one another's shapes.

3.09.04

3.09.04.01 define and identify a sphere, cube, cone, and cylinder

STRATEGY 1: Prepare and display a group of objects representing a sphere, a cube, a cone, and a cylinder, e.g., a ball, a block, an ice cream cone, a tennis ball container. Display the ball. Say, "What shape is this? (It is round.) How many sides does it have? (It has no sides.) How many corners does it have? (It has no corners.) This shape has a special name. It is called a sphere." On the chalkboard write sphere. Ask the students to name objects which are shaped like a sphere and write them on the chalkboard as the students list them in their notebooks. Probe for deeper understanding with questions such as the following:

- Why isn't a football a sphere? (A football has 2 points.)
- How many corners does a sphere have? (A sphere has no corners.)
- Explain why a penny is not a sphere. (A penny is round, but flat.)

Repeat this procedure with the other objects.

STRATEGY 2: Prepare four clear plastic bags labeled A, B, C, and D, and a large box filled with objects representing a sphere, cube, cone, and cylinders, e.g., a ball, a block or box, sugar cubes, a can, a party hat, and an ice cream cone.

Say, "We will sort the figures in the large box into four groups, A, B, C, and D." Ask several students to come to the front of the room. Say, "Select an object with 1 point and place it in bag A. Which objects were placed in bag A? (The ice cream cone and the party hat were placed in bag A.) What else do you notice about these objects? (They all have

STRATEGY 2: cont'd

rounded sides.) The objects in bag A are all cone shaped. Each cone has 1 face and no edges.

Repeat this procedure for the sphere, the cube, and the cylinder. Ask the students to close their eyes and remove an object from one of the plastic bags. Say, "Which shape did you remove? Explain." Ask questions which will elicit responses which describe the properties of each solid figure, e.g., Is it round? Does it have a flat surface? Does it have both flat and round surfaces? Does it have corners?

3.09.04.02 **identify the vertex, edge, line segment, angle, and face of a solid figure**

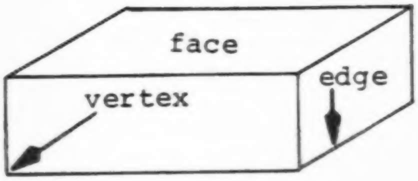
STRATEGY 1: Prepare a box with objects representing plane rectangles and rectangular solids. Ask a student to examine the objects, consider their shapes, and sort them in two piles. Say, "What are these shapes? (They are all rectangles.) How are the objects in the two piles different? (The objects in one pile are flat and the objects in the other pile are thick.) What do we call the shapes which are flat? (They are called plane figures.) What are the other figures called?" (They are called solids figures.)

Display the plane figures and say, "We have learned about plane rectangles. What makes them special?" (They have 4 sides, 4 corners or angles, the opposite sides are equal in length, and they are flat.)

Say, "Today we will learn some new words which describe the rectangular solids." Display a rectangular solid with a corner, a face, and an edge so labeled.

STRATEGY 1: cont'd

e.g.,



Say, "Where is a face on a rectangular solid? (The face on a rectangular solid is the flat side of the solid.) How many faces does it have? It has 6 faces.) Where is an edge? (An edge is where 2 faces meet.) How many edges does it have? (It has 12 edges.) Where is the vertex? (The vertex is where 3 edges meet.) How many vertices or corners does it have?" (It has 8 vertices or corners.) After each question is asked and answered, ask a student to point to and name each part of the rectangular solid. On the chalkboard write the attributes of a rectangular solid as the students write them in their notebooks.

Repeat this procedure for other solid figures.

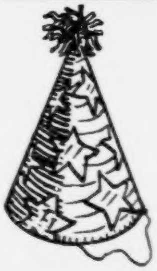
Note: The plural of vertex is vertices.

P.O. 3.09.04.01

NAME: ______________________ CLASS: ________ DATE: ________

Write the name of each shape (cone, cylinder, sphere, or cube) under each picture.

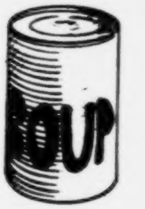
①



A party hat is a

______________.

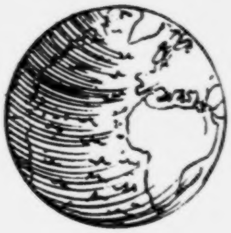
②



A soup can is a

______________.

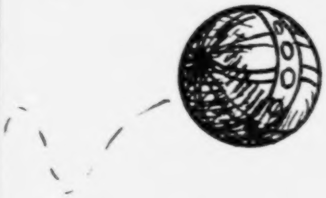
③



The Earth is a

______________.

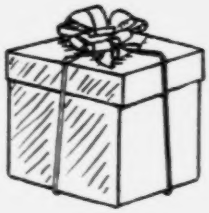
④



A ball is a

______________.

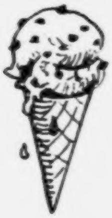
⑤



This gift box is a

______________.

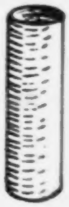
⑥



The cracker that holds the ice cream is a

______________.

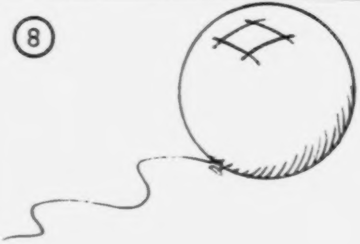
⑦



A water pipe is a

______________.

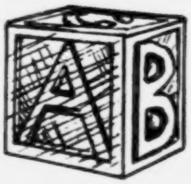
⑧



This balloon is a

______________.

⑨



A baby's block is a

______________.

DO YOU REMEMBER?

$1.00 = _____ quarters, _____ dimes, and _____ pennies

$5.00 = 3 one dollar bills, _____ half-dollars, and _____ pennies

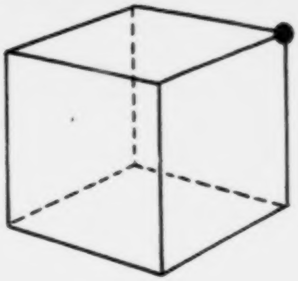
$10.00 = _____ five dollar bill, and _____ quarters

P.O. 3.09.04.02

NAME: ______________________ CLASS: ________ DATE: ________

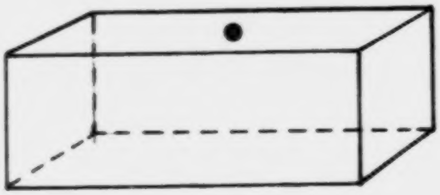
Write the name of the part of each figure (vertex, face, edge, or angle) which is marked with the dot.

①



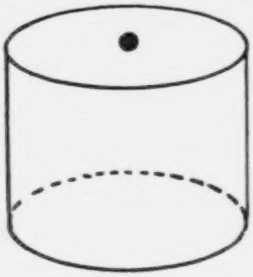
The dot is on the vertex.

②



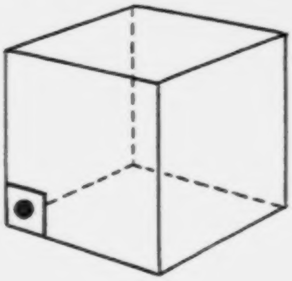
The dot is on the ____________.

③



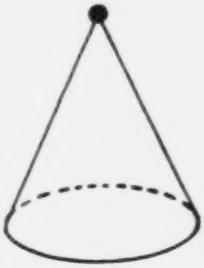
The dot is on the ____________.

④



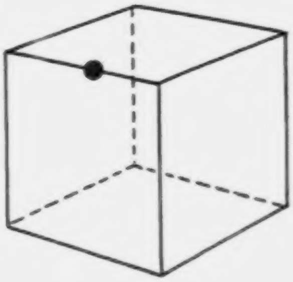
The dot is on the ____________.

⑤



The dot is on the ____________.

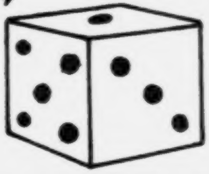
⑥



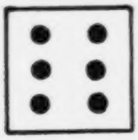
The dot is on the ____________.

CHALLENGE!

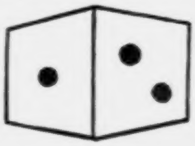
Some of the faces on the dice are hidden. How many faces are hidden on each die?



__ faces are hidden.



__ faces are hidden.



__ faces are hidden.

3.09.05 COORDINATE POSITIONS

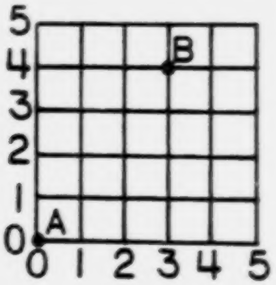
(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

3.09.05.01B	give directions for getting from one place to another on a grid using horizontal and vertical paths;

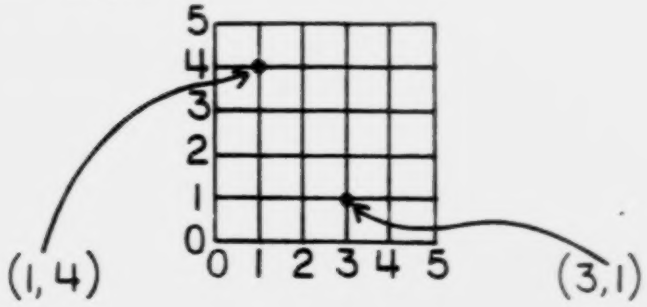
e.g.,



What ordered pair goes with B? ...with A? Describe a path from A to B.

3.09.05.02B	identify points on a grid by using ordered pairs.

e.g.,



VOCABULARY

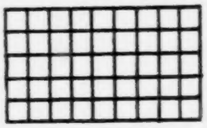
TERMS

grid
ordered pairs
horizontal
vertical
diagonal

GETTING STARTED 1:

Use masking tape to create a grid on the classroom floor. Each square should be large enough to accommodate one standing student.

e.g.,



Say, "We will use this grid to play a game." Ask a student to stand in a box at the corner of the grid which will allow him/her to move 3 squares to the left and 6 squares toward the front or back of the room. Ask another student to stand at another corner which will allow him/her to move 7 squares to the right and 8 squares toward the back or front of the room. Say, "How many squares to the right (or left) forward (or backward) would Ann have to move to reach Bob?" (She would have to move ____ squares to her left (or right) and ____ squares toward the front (or back).

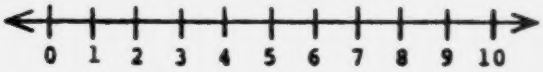
Repeat this procedure with the other students. As an alternative, ask the students who are not participating to give directions.

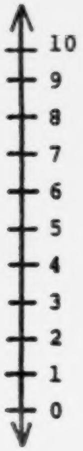
GETTING STARTED 2:

Prepare and display a horizontal number line and a vertical number line.

GETTING STARTED 2: cont'd

e.g.,





Ask a student to identify the horizontal number line. Say, "Put your finger on zero. Count 4 spaces to the right. On what number did you land? (I landed on the 4.) Now move 3 spaces to the left. On what number did you land? (I landed on the 1.) Move 6 spaces to the right. On what number did you land?" (I landed on the 7.)

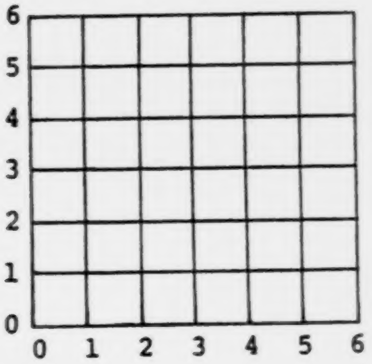
Repeat this procedure with other students using both the vertical and the horizontal number lines.

3.09.05

3.09.05.01 **give directions for getting from one place to another on a grid using horizontal and vertical paths**

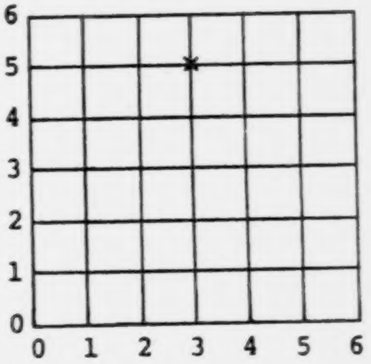
STRATEGY 1: Prepare a large grid on the classroom floor using masking tape.

e.g.,



Place a student at point (3,5).

e.g.,

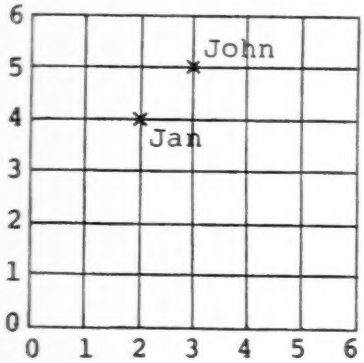


Say, "We can indicate where this student is standing by using the grid and the numbers along the edges of the grid. The lines which go from the front of the room to the back of the room are the vertical lines. What can we call the lines that go from side to side? (The lines which go from side to side are called horizontal lines.) Each line is numbered. When we identify the place where the student is standing we say the number of the vertical line first and the number of the horizontal line second. These two

STRATEGY 1: cont'd

numbers are called an ordered pair. On the chalkboard write: ordered pair. Say, "Look where 'John' is standing. What is the number of the vertical line he is touching? (The vertical line he is touching is number 3.) What is the number of the horizontal line he is touching?" (The horizontal line he is touching is number 5.) On the chalkboard write: John is standing at (3,5). Say, "Ordered pairs are written by placing a comma between the numbers and a parentheses around the numbers."

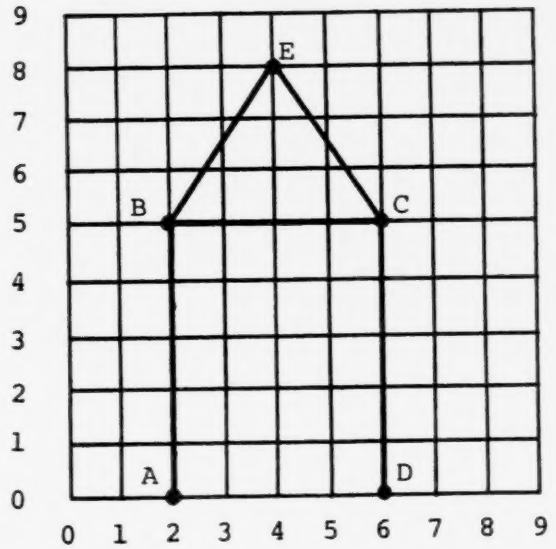
Place another student (Jan) at (2,4).
e.g.,



Say, "Where is Jan standing on the grid? (Jan is standing at 2,4), Explain. (The vertical line on which Jan is standing is labeled 2 and the horizontal line is labeled 4. We name the vertical line first and the horizontal line second.) By moving vertically and horizontally how can John, who is standing at (3,5), reach Jan, who is standing at (2,4)?" (John can move down one space to the 4 and then left one space to the 2. He will then be at the same point as Jan.)

Repeat this procedure with the other students. Alternatively, the students may determine on which ordered pairs they will stand.

STRATEGY 2: Prepare and duplicate grids for each student. Display a large grid containing a picture of a house. e.g.,



Say, "An ordered pair can tell us the location of any point. First we look at the vertical line on which the point is located. Then we look at the horizontal line on which it is located. Look at point A on the bottom of the drawing. On what vertical line is point A located? (Point A is located on the vertical line labeled two.) On what horizontal line is Point A located? (Point A is located on the horizontal line labeled zero.) Therefore the ordered pair for point A is (2,0). It is written with a comma between the numbers and enclosed in parentheses." Demonstrate, e.g., (2,0).

Say, "If we want to draw a line from point A to point B, to what ordered pair would we go? (We would go to 2,5.) How would we draw the line?" (We would move 5 spaces vertically.) Repeat the above procedure for each line. Ask the students to duplicate the drawing using the grids they were given. Say, "How did we know how to draw the lines? (Directions were given using ordered pairs.) In an ordered pair, which

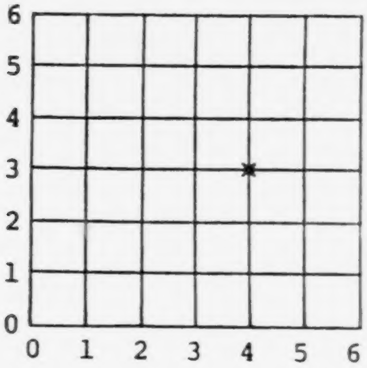
STRATEGY 2: cont'd

number comes first? (The number representing the vertical line comes first.) This number can be found along the horizontal axis. Which number in an ordered pair represents the horizontal line? (The second number represents the horizontal line.) This number can be found along the vertical axis."

3.09.05.02 **identify points on a grid by using ordered pairs**

STRATEGY 1: Using tape, prepare a grid on the classroom floor. Number each line starting with 0. Place an X at (4,3).

e.g.,



Say, "We have made part of the classroom floor into a grid. What is a grid? (A grid has vertical and horizontal lines which cross each other.) Which are the horizontal lines? ... vertical lines? (The lines going across the room are called horizontal lines. The lines which go from front to back are called vertical lines.) What else do you notice about the lines? (Each line has a number.) Why are the lines numbered?" (We give the lines numbers because they help us locate points on the grid.)

Ask a student, e.g., Billy, to stand on the X. Say, "How can we use the grid to locate Billy? (We can use ordered pairs of numbers.) What does each number tell us? (The first number tells us how far to move along the horizontal axis from zero. The second

STRATEGY 1: cont'd

number tells us how far to move along the vertical axis from zero.) The numbers are always written in that order; horizontal then vertical." On the chalkboard write: (4,3). Say, "This tells us to start at 0 and walk across the grid to the line labeled 4. We then turn and walk toward the horizontal line labeled 3. We will then be at point (4,3) and there we will find Billy."

Place another student on the grid at any point where two lines meet. Say, "What ordered pair tells us where he/she is standing?" The response depends upon the student's placement. Say, "Which line is represented by the first number? (The first number represents the vertical line.) What does the second number represent? (The second number represents the horizontal line.) What do we call these horizontal and vertical lines? (They are called a grid.) What do we call the two numbers which represent the point where a vertical and a horizontal line meet?" (We call them an ordered pair.)

Repeat this procedure with the other students in other positions on the grid. Alternatively, ask a student to give an ordered pair of numbers representing a point on which another student will stand. Ask the students to write the ordered pairs in correct notation in their notebooks as they are recorded on the chalkboard.

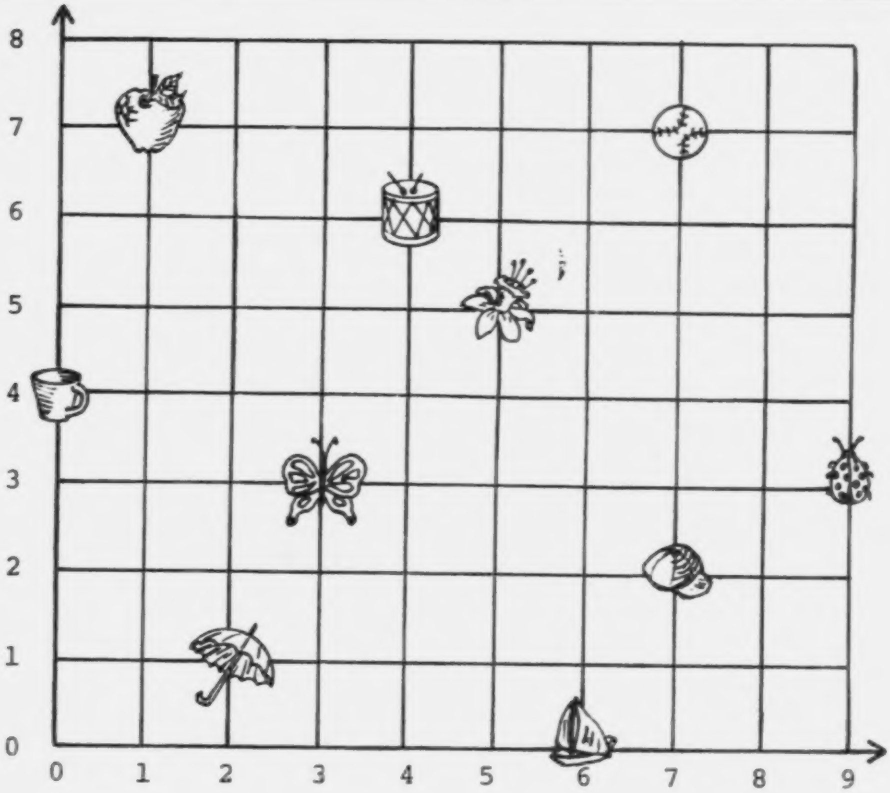
e.g.,

Charles is standing at (4,3).
Pam is standing at (0,6).
Bob is standing at (2,1).

P.O. 3.09.05.01-.02

NAME: ____________________ CLASS: ________ DATE: ________

Use the grid to answer the questions below.



① For the butterfly to land on the flower, it must go ____ spaces horizontally and _____ spaces vertically.

② For the ladybug to find the apple, it must go _____ spaces horizontally and ______ spaces vertically.

③ For the umbrella to stop the baseball from getting wet it must go _____ spaces horizontally and ______ spaces vertically.

Write the ordered pairs which give the location for each.
The first is done for you. baseball (7,7)

apple __________ sailboat __________ cup __________
flower __________ butterfly __________ drum __________
ladybug __________ umbrella __________ cap __________

828

Unit 51

3.04.07 MULTIPLICATION OF EIGHTS AND NINES

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.04.07.01A multiply eight (8) by the numbers one (1) through nine (9) using vertical and horizontal formats;

e.g.,

$$\begin{array}{r} 8 \\ \underline{\times 1} \\ 8 \end{array} \qquad \begin{array}{r} 8 \\ \underline{\times 2} \\ 16 \end{array} \qquad \begin{array}{r} 8 \\ \underline{\times 3} \\ 24 \end{array}$$

$1 \times 8 = 8$
$2 \times 8 = 16$
$3 \times 8 = 24$

3.04.07.02A multiply nine (9) by the numbers one (1) through nine (9) using vertical and horizontal formats;

e.g.,

$$\begin{array}{r} 9 \\ \underline{\times 1} \\ 9 \end{array} \qquad \begin{array}{r} 9 \\ \underline{\times 2} \\ 18 \end{array} \qquad \begin{array}{r} 9 \\ \underline{\times 3} \\ 27 \end{array}$$

$1 \times 9 = 9$
$2 \times 9 = 18$
$3 \times 9 = 27$

*3.04.07.03A apply the commutative property of multiplication to the eight and nine times tables;

e.g.,

$8 \times 9 = 72$
$9 \times 8 = \square$
$9 \times 8 = 8 \times 9$
$8 \times 9 = \square \times 8$

3.04.07.04A solve word problems related to skills learned in this module.

e.g.,

There are 6 shelves with 8 books on each shelf. How many books are there in all?

VOCABULARY

TERMS

factors
product
vertical
horizontal
commutative

GETTING STARTED 1:

Prepare and distribute a multiplication table for each student or group of students. Display a partially completed multiplication table.

e.g.,

X	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4		6	7	8	9
2	0			6	8					
3	0		6		12					
4	0		8	12				28		36
5	0							35	40	
6	0		12					42	48	
7	0			21						
8	0	8		24	32					
9	0	9								

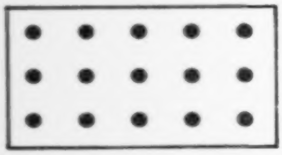
Review the method for finding a product on a multiplication table when two factors are given. Ask a student to demonstrate how he/she can find the product of 5 x 3. Review the method for finding the factors when a product is given. Say, "Besides finding products when factors are given or finding factors when products are given, how else can the multiplication table help us?" (It shows us that the row and column of products which are 0 indicate that when 0 is a factor, the product is always 0.) Ask a student to point this out on the chart. Say, "What other patterns do you see?" (When 1 is a factor, the product is equal to the other factor. For example, 6 x 1 = 6.) Ask a student to point this out on the chart. Say, "We can use the multiplication table to find the product of two factors and also as a way of remembering important rules such as commutation."

3.04.07

GETTING STARTED 2:

Prepare magnetic discs. Prepare and distribute placemats and plastic chips for each student or group of students. Say, "Today we will use chips to make arrays representing basic multiplication facts." Ask a student to demonstrate while the other students work at their desks. Say, "Display an array for 3 groups of five."

e.g.,



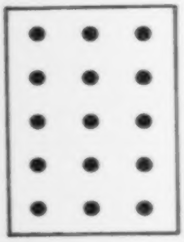
Ask the students to write the basic fact for 3 groups of five in both horizontal and vertical formats.

e.g.,

$$3 \times 5 = 15 \qquad \begin{array}{r} 5 \\ \underline{\times 3} \\ 15 \end{array}$$

Ask the students to turn their placemats and arrays a quarter turn. Demonstrate.

e.g.,



Say, "What is the basic fact which represents the array now?" (The basic fact which represents the array is 5 x 3 = 15.) What do we know about multiplication that helps explain why both 5 x 3 = 15 and 3 x 5 = 15?" (Multiplication, like addition, is commutative. The order of the factors does not change the product.)

Repeat this procedure for other basic multiplication facts.

3.04.07

3.04.07.01 **multiply eight by the numbers one (1) through nine (9) using vertical and horizontal formats**

STRATEGY 1: Adapt Strategy 1, P.O. 3.04.03.02 (p.33 S.1).

STRATEGY 2: Adapt Strategy 2, P.O. 3.04.01.02 (p.33 S.2).

3.04.07.02 **multiply nine by the numbers one (1) through nine (9) using vertical and horizontal formats**

STRATEGY 1: Adapt Strategy 1, P.O. 3.04.04.01 (p.34 S.1).

STRATEGY 2: Adapt Strategy 2, P.O. 3.04.04.01 (p.34 S.1).

3.04.07.03 **apply the commutative property of multiplication to the eight and nine times tables**

STRATEGY 1: Adapt Strategy 1, P.O. 3.04.05.03 (p.45 S.5).

STRATEGY 2: Adapt Strategy 2, P.O. 3.04.05.03 (p.45 S.6).

3.04.07.04 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard:

> Each of 8 teams in the Staten Island Baseball League must order uniforms for its players. With 9 players on each team, how many uniforms must be ordered?

Say, "How would you solve this problem?" Accept all reasonable responses.

e.g.,

- I would add 9 eight times because there are 8 teams with 9 players on each team.

STRATEGY 1: cont'd

- I would draw a picture with stick figures representing each player on each team.
- I would multiply 8 times 9 because this is simpler than adding 9 eight times.
- I would draw a chart as follows:

Number of Teams	1	2	3	4	5	6	7	8
Number of Uniforms	9	18	27	36	45	54	63	72

Say, "Although all of these methods would lead to the correct answer to the problem, one of the methods is best because it is more direct than the others. Which one is that?" Elicit that 8 x 9 = 72 is the most direct. Ask a student to write the algorithm on the chalkboard in both horizontal and vertical formats.

e.g.,

8 x 9 = 72

$$\begin{array}{r} 9 \\ \underline{\times 8} \\ 72 \end{array}$$

Ask a student to label each number to indicate what each one refers to as the other students write this in their notebooks.

e.g.,

$$\begin{array}{rl} 9 & \text{number of players on each team} \\ \underline{\times 8} & \text{number of teams in the Staten Island Baseball League} \\ 72 & \text{number of uniforms needed} \end{array}$$

STRATEGY 2: Adapt Strategy 2, P.O. 3.04.05.04 (p.45S.7).

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P.O.3.04.07.01 & .04

NAME: ____________ CLASS: ______ DATE: ______

Follow the directions below.

The Lady with the Light is Quite a Sight

Who is the lady? Solve each multiplication example. Use the Key to place the letters in the spaces on the chart.

5 x5	8 x5	8 x7	8 x5	8 x1	8 x3		8 x6	8 x0		8 x8	8 x2	6 x6	8 x3	8 x9	8 x5	8 x4
25																
S																

Key

25 = S 40 = T 8 = U 36 = B

56 = A 0 = F 48 = O 32 = Y

24 = E 64 = L 16 = I 72 = R

Solve the problems.

6 students went up to Miss Liberty's torch. Each student released 8 balloons over the harbor. How many balloons were released? _____ balloons were released.	In 1 school there were 8 students from each of 5 classes who entered the Miss Liberty poetry contest. How many students entered the contest? _____ students entered the contest.

P.O. 3.04.07.01,.02,.04

NAME: ____________________ **CLASS:** ________ **DATE:** ________

Follow the directions below.

Write the product for each example.

8	8	8	8	8	8	8	8	8
x1	x2	x3	x4	x5	x6	x7	x8	x9
$\boxed{8}$	$\boxed{}$	$\boxed{}$	$\boxed{}$	$\boxed{}$	$\boxed{}$	$\boxed{}$	$\boxed{}$	$\boxed{}$

1 x 9 = $\boxed{9}$	4 x 9 = $\boxed{}$	7 x 9 = $\boxed{}$
2 x 9 = $\boxed{}$	5 x 9 = $\boxed{}$	8 x 9 = $\boxed{}$
3 x 9 = $\boxed{}$	6 x 9 = $\boxed{}$	9 x 9 = $\boxed{}$

Solve the following examples. Then write them in vertical format.

6 x 9 = $\boxed{54}$	5 x 9 = $\boxed{}$	7 x 9 = $\boxed{}$
$\boxed{9}$	$\boxed{}$	$\boxed{}$
x $\boxed{6}$	x $\boxed{}$	x $\boxed{}$
$\boxed{54}$	$\boxed{}$	$\boxed{}$

Solve the problems.

In January, 9 students lost their red mittens. In February, 9 students lost their green mittens. In March, 9 students lost their blue mittens. How many students lost their mittens during these 3 months?

________________ students lost their mittens.

From January through May, 8 students wrote stories about the holidays. Each student wrote 1 story each month. There were ________ stories written in all.

P.O. 3.04.07.03

NAME: ______________________ CLASS: ________ DATE: ________

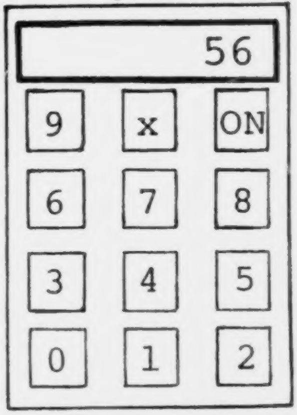
Follow the directions below.

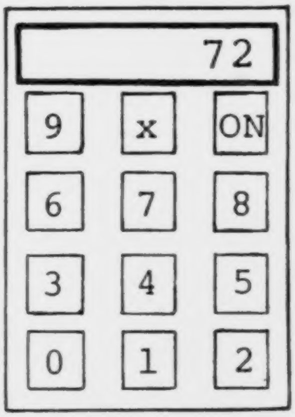
Complete each open number sentence.

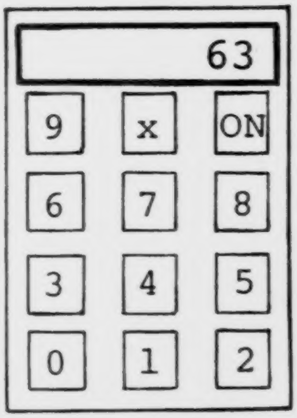
8 x 9 = 72 9 x 8 = ☐	7 x 8 = 56 8 x 7 = ☐	5 x 9 = 45 9 x 5 = ☐
3 x 8 = 24 ☐ x 3 = 24	9 x 8 = ☐ 8 x 9 = ☐	6 x ☐ = 54 ☐ x 6 = 54
9 x 8 = ☐ x 9	☐ x 8 = 8 x 6	3 x 9 = 9 x ☐

CALCULATOR RIDDLES

Circle the two buttons that were pressed on each calculator to get the product.

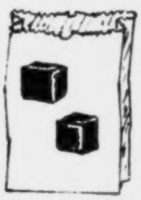

56
9 x ON
6 7 8
3 4 5
0 1 2


72
9 x ON
6 7 8
3 4 5
0 1 2


63
9 x ON
6 7 8
3 4 5
0 1 2

☐ x ☐ = 56	☐ x ☐ = 72	☐ x ☐ = 63
☐ x ☐ = 56	☐ x ☐ = 72	☐ x ☐ = 63

Do you remember?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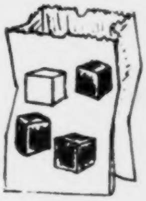
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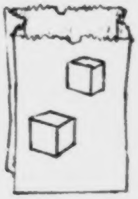

C

1. From which bag are you certain to draw a white cube? ________
2. From which bag is it impossible to draw a white cube? ________
3. From which bag are you most likely to draw a black cube? ________

Unit 52

3.05.05 DIVISION OF WHOLE NUMBERS FOR EIGHTS THROUGH 72, FOR NINES THROUGH 81

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.05.05.01A divide by 8 for dividends to 72 without a remainder;

e.g.,

		check
$16 \div 8 = 2$;	$\begin{array}{r}2\\8\overline{)16}\end{array}$;	$2 \times 8 = 16$
$24 \div 8 = 3$;	$\begin{array}{r}3\\8\overline{)24}\end{array}$;	$3 \times 8 = 24$
$40 \div 8 = 5$;	$\begin{array}{r}5\\8\overline{)40}\end{array}$;	$5 \times 8 = 40$

3.05.05.02A divide by 9 for dividends to 81 without a remainder;

e.g.,

		check
$18 \div 9 = 2$;	$\begin{array}{r}2\\9\overline{)18}\end{array}$;	$2 \times 9 = 18$
$27 \div 9 = 3$;	$\begin{array}{r}3\\9\overline{)27}\end{array}$;	$3 \times 9 = 27$
$63 \div 9 = 7$;	$\begin{array}{r}7\\9\overline{)63}\end{array}$;	$7 \times 9 = 63$

3.05.05.03A solve word problems related to skills learned in this module.

e.g.,

Angel had 63 baseball cards. He made stacks of 9 cards each. How many stacks of cards did he make?

VOCABULARY

TERMS

division
divide
quotient

divisor
dividend

GETTING STARTED 1:

Prepare and display a hundreds chart. Prepare and distribute hundreds charts to each student or group of students. Say, "We will skip count by eights beginning with the number 8 and ending with the number 72. If I tap your shoulder, you will say 8. You will then tap the shoulder of a classmate who will say the next number when counting by 8. We will repeat this until we have skip counted by 8 through 72." When the students have completed the skip counting ask them to circle the multiples of 8 on their hundreds charts.

Repeat this procedure for multiples of 9 through 81.

GETTING STARTED 2:

Say, "I will give you information needed to solve division story problems. You will make up a question for which that information can be used."

e.g.,

> 5 members of a Little League baseball team celebrated their victory by going to an amusement park. They spent 45 dollars in all.

Say, "What question could we ask to make this a division story problem?" (How much money did each player spend if each player spent an equal amount?) Ask a student to write 2 division examples representing this problem.

e.g.,

$45 \div 5 = 9$ $\quad$ $5\overline{)45}$ with quotient 9 $\quad$ Each player spent 9 dollars.

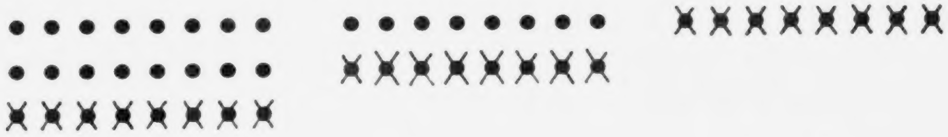
Repeat this procedure with other partially completed division story problems.

3.05.05

3.05.05.01 divide by 8 for dividends to 72 without a remainder

STRATEGY 1: Prepare and distribute chips to each student or group of students. Ask each student or group to count 24 chips. Say, "What is one way to determine the number of groups of eight there are in 24? (We can do it by subtracting. We can begin by removing 1 group of eight from the group of 24 and continue removing groups of 8 until there are no more groups of 8.) Ask a student to demonstrate as the other students remove groups of 8 at their desks.

e.g.,



$$\begin{array}{r} 24 \\ -\ 8 \\ \hline 16 \end{array} \qquad \begin{array}{r} 16 \\ -\ 8 \\ \hline 8 \end{array} \qquad \begin{array}{r} 8 \\ -\ 8 \\ \hline 0 \end{array}$$

Say, "Is there another way to determine the number of groups of 8 there are in 24? (We can divide.) What division number sentence demonstrates this repeated subtraction of the same number?" (24 ÷ 8 = 3) Ask a student to write on the chalkboard the division algorithms and the check which represent 24 ÷ 8 = 3 as the other students write them in their notebooks.

e.g.,

$$24 \div 8 = 3 \qquad 8\overline{)24}^{\,3} \qquad \underline{\text{check}}\quad 3 \times 8 = 24$$

Repeat this procedure for other multiples of eight.

STRATEGY 2: Adapt Strategy 1, P.O. 3.05.03.02 (p.46S.2) for dividends through 72 without a remainder.

3.05.05

3.05.05.02 **divide by 9 for dividends to 81 without a remainder**

STRATEGY 1: Tell a story about the Yankees and the Mets. Discuss the number of players on a baseball team. Ask eighteen students to stand. Say, "How many baseball teams can we make with these 18 students?" (We can make 2 teams.) How many players will be on each team?" (There will be 9 players on each team.) Ask 2 students to write 2 different division algorithms representing this story.

e.g.,

$$18 \div 9 = 2 \qquad 9\overline{)18}^{\,2}$$

Say, "How can we be sure our answers are correct? Explain." (We can check our work by multiplying 2 x 9 = 18. We found that there are 2 teams by dividing the 18 players into 2 groups of 9. We checked it by multiplying the 9 players on each team by the 2 teams. This equals 18.)

Repeat this procedure using 27 students and 36 students respectively. Develop the remaining division algorithms and checks on the chalkboard as the students write them in their notebooks.

3.05.05.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare 32 sticks and several shoe laces. Write a word problem on the chalkboard.

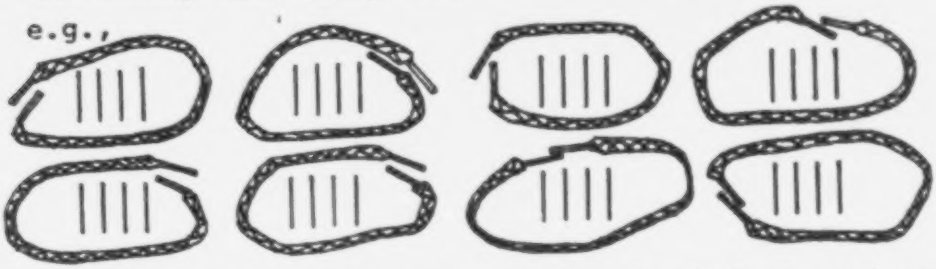
e.g.,

> 8 student gardeners are working at the New York Botanical Garden. The chief gardener wants 32 rose bushes planted. If each student plants an equal number of rose bushes, how many will each student plant?

STRATEGY 1: cont'd

Display the sticks. Say, "These sticks represent the number of rose bushes to be planted. How many sticks should we have? (We should have 32 sticks.) How many student gardeners are there? (There are 8 student gardeners.) How can we use these sticks and shoe laces to solve this problem? (We can line up the 32 sticks and then separate them into 8 equal groups.) How does this solve the problem?" (Each group of sticks will represent the number of rose bushes each student gardener will plant.) Ask a student to demonstrate by using the sticks and encircling each group with a shoe lace.

e.g.,



Say, "How many rose bushes will each student gardener plant? Ask a student to write and solve 2 division algorithms which represent this problem.

e.g.,

$32 \div 8 = 4$ $\begin{array}{r}4\\ 8\overline{)32}\end{array}$

Repeat this procedure for other story problems for division by 8 and 9.

STRATEGY 2: On the chalkboard write division examples.

e.g.,

$36 \div 9 = 4$ $\begin{array}{r}4\\ 9\overline{)36}\end{array}$

Say, "Today we will write our own division stories. Look at the division number sentences on the chalkboard. Which number tells us the amount with which we begin? (36 tells us the amount with which we begin.) What do we call the 36? (36 is called

STRATEGY 2: cont'd

the dividend.) Which number tells us into how many groups we will divide 36? (9 tells us into how many groups 36 will be divided.) What do we call the 9? (The 9 is called the divisor.) Which number tells us the answer? (4 tells us the answer.) What do we call the answer in a division sentence? (The answer is called the quotient.) What is the quotient telling us? (The quotient is telling us how many items there are in each of the 9 groups.) Pretend there are 36 books to be shared among 9 students. What would be a good question to ask about this information so that 36 ÷ 9 = 4 makes sense?" Accept all reasonable responses.

e.g.,

- How can the books be shared equally?
- How many books will each student get?

Say, "You were given a division sentence and some information. Then you wrote a question to complete the problem. Now you will be given only the number sentence. You will write a story problem and a question to fit the number sentence."

On the chalkboard write several number sentences with divisors of either 8 or 9. Divide the students into groups. Ask each group to select a number sentence and write a story problem to fit the number sentence. When the students have completed the number stories, ask them to read their stories aloud as the other students determine which number sentence fits the story.

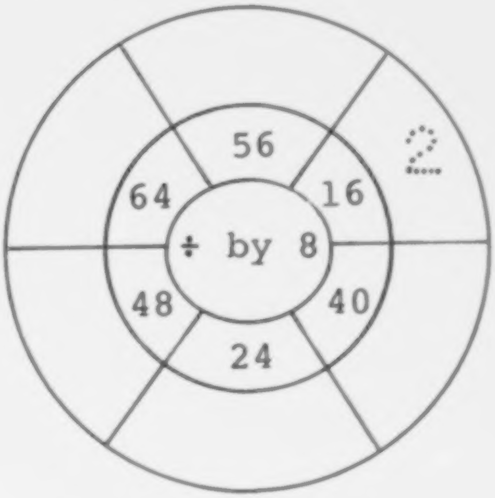
Ask a student from each group to record the story problem on an index card so they can be used for future homework or 'Do Now' assignments.

P.O. 3.05.05.01 & .03

NAME: ____________________ CLASS: __________ DATE: ________

Follow the directions below.

Complete the division wheel.



Solve each example and check.

☐
8) 8

check

☐
8) 32

check

☐
8) 72

check

Write a question for each problem and solve.

Bob has been raising sheep in Australia. His 56 sheep share 8 pens equally.

Question: ____________________

____

____

solve

Surfing is very popular in Australia. There are a total of 32 surfers on all 8 teams.

Question: ____________________

____

____

solve

Do you remember?

Two large groups of kangaroos joined to make a single group. One group had 369 kangaroos and the other group had 376 kangaroos. How many kangaroos are there in the new group?

There are _____ kangaroos in the new group.

P.O. 3.05.05.02-.03

NAME:____________________ CLASS:________ DATE:________

Follow the directions below.

Solve each division example. Rewrite each example horizontally and check.

$\begin{array}{r}2\\9\overline{)18}\end{array}$ $18 \div 9 = 2$ **check** $2 \times 9 = 18$	$9\overline{)36}$ **check**	$9\overline{)54}$ **check**	$9\overline{)72}$ **check**	$9\overline{)27}$ **check**
$9\overline{)45}$ **check**	$9\overline{)81}$ **check**	$9\overline{)72}$ **check**	$9\overline{)63}$ **check**	$9\overline{)9}$ **check**

Solve each problem.

54 live parrots were captured in the Amazon Jungle. An equal number of these parrots were sent to 9 zoos in the United States. How many parrots were sent to each zoo?

solve

__________ parrots

9 people went on the parrot hunt. There were photographers, bird experts, students, jeep drivers, and a doctor. The cooking was shared equally during the 18 days of the hunt. For how many days did each person have to cook?

solve

__________ days

Unit 53

3.11.02 INEQUALITIES

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*3.11.02.01A read and write addition and multiplication inequalities;

e.g.,

$$1 + 6 < 8$$
$$3 \times 2 < 11$$

3.11.02.02A solve inequalities involving addition and multiplication and write solution sets.

e.g.,

$$\square + 8 < 11$$

solution set $= \{0, 1, 2\}$

$$\square \times 2 < 10$$

solution set $= \{0, 1, 2, 3, 4\}$

VOCABULARY

TERMS	SYMBOLS
greater than	>
less than	<
solution set	{0,2,4}

GETTING STARTED 1:

Prepare cards with representations of the symbols greater than (>), less than (<), and equal to (=). Tape the symbol > on the chalkboard. Say, "What does this symbol represent?" (This symbol represents greater than.) Ask a student to write a number on the left side of the symbol and another number on the right side of the symbol to make a true statement, e.g., 413 > 27. Say, "Is this statement true? Explain." (This statement is true because 413 is greater than 27.)

Repeat this procedure with the symbols < and =. Include numbers through 4 digits. Ask the students to copy the statements into their notebooks.

e.g.,

$$413 > 27$$
$$25 < 78$$
$$6000 = 6000$$

GETTING STARTED 2:

Prepare several cards, each with a symbol, e.g., $\boxed{>}$, $\boxed{<}$, $\boxed{=}$. Prepare several red, blue, and yellow chips for each student or group of students. Say, "Each color represents a different value on a place value chart. What value should we assign each color?" (The yellow chips represent ones, the blue chips represent tens, and the red chips represent hundreds.) On the chalkboard write: Y = ones, B = tens, R = hundreds.

On the chalkboard write the symbols >, <, and =. Ask the students to identify each symbol and discuss its meaning. Ask several students to illustrate the meaning of each symbol with an example, e.g., 12 > 3, 37 < 106, 8 x 2 = 16.

GETTING STARTED 2: cont'd

Distribute the chips and symbol cards. Say, "How can we use the cards and chips to illustrate that 12 is greater than 3?" (We can place 1 blue chip and 2 yellow chips on the left side of the desk to represent 12, 3 yellow chips on the right side of the desk to represent 3, and the card with the greater than symbol in the middle.)

e.g.,

Ⓑ Ⓨ Ⓨ > Ⓨ Ⓨ Ⓨ

On the chalkboard write the following:

B Y Y > Y Y Y
12 > 3

Ask the students to write this in their notebooks.

Repeat this procedure for other inequalities which include numbers through 3 digits.

e.g.,

B < BBY
10 < 21

BBBBYYY > BBYYYYYYY
43 > 27

RRBYY > RBBB
212 > 130

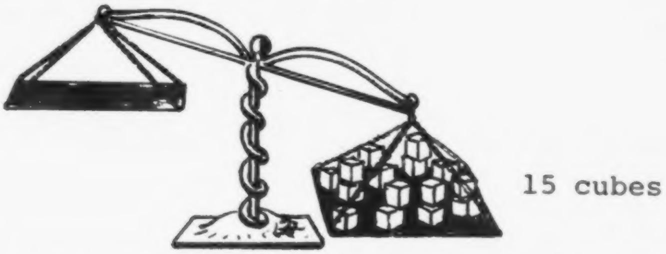
BBBBB < R
50 < 100

3.11.02

3.11.02.01 read and write addition and multiplication inequalities

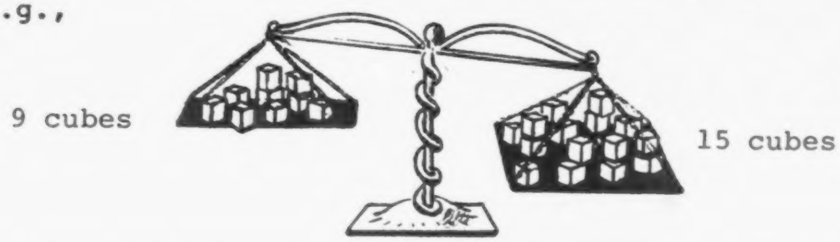
STRATEGY 1: Prepare a pan balance and interlocking cubes. Ask a student to grasp two handfuls of cubes, count them, and place them in one of the pans.

e.g.,



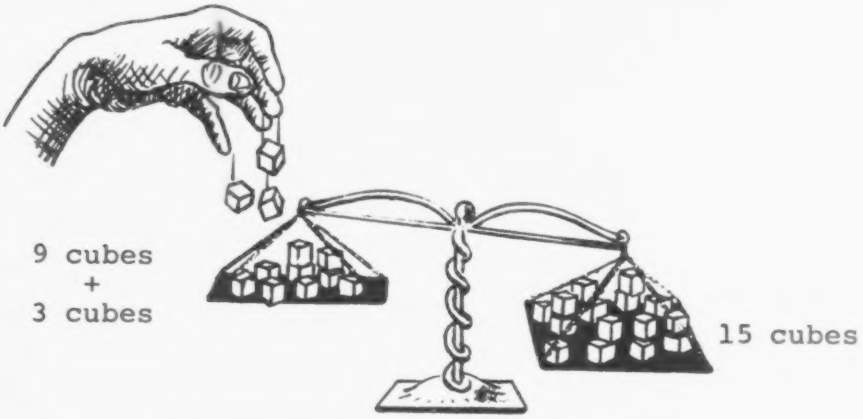
Ask another student to grasp one handful of cubes, count them, and place them in the other pan.

e.g.,



Ask another student to place 3 cubes in the pan with 9 cubes.

e.g.,

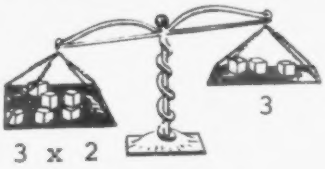


Say, "We can write a number sentence to show what we did with the cubes. How many cubes were placed on the left pan the first time? (9 cubes.) How many were placed on the left pan the second time?" (3

STRATEGY 1:
cont'd

cubes.) On the chalkboard write: 9 + 3. Say, "How many cubes were placed on the right pan? (15 cubes.) Which is greater, 9 + 3 or 15? (15 is greater.) How can we tell, without counting, that the left pan has fewer cubes than the right pan?" (The left pan is higher than the right pan.) Ask a student to write the symbol for 'less than' on the chalkboard, e.g., <. Ask another student to write 9 + 3 on the left side of the symbol and 15 on the right side of the symbol, e.g., $9 + 3 < 15$. Say, "How do we read this statement? (Nine plus three is less than fifteen.) This shows an inequality. Why do you think we call this an inequality?" (We call this an inequality because the total on one side of the 'less than' symbol is different than the total on the other side of the 'less than' symbol.)

Note: When demonstrating multiplication inequalities, ask the students to display equal groups of cubes which will then be placed on the pan balance. e.g.,



$3 \times 2 > 3$

STRATEGY 2: Prepare several cards with stories which tell about addition or multiplication inequalities.
e.g.,

Huge Heads of Broccoli

A 22 pound head of broccoli was grown in England. A 14 pound and a 10 pound head of broccoli were grown in the U.S.

Giant Onions

In California, 3 onions, each weighing 7 pounds were grown. In Oregon a 14 pound onion was grown.

STRATEGY 2:
cont'd

Ask the students to read each story. Say, "What are these stories about? (These stories are about very big vegetables.) Look at the first story. What is its title? (It's title is Huge Heads of Broccoli.) How many huge heads of broccoli were grown in England? (1 huge head of broccoli was grown in England.) How much did it weigh? (It weighed 22 pounds.) How many huge heads of broccoli were grown in the U.S.?) (2 huge heads of broccoli were grown in the U.S.) How much did they weigh? (One weighed 14 pounds and the other weighed 10 pounds.) What is the total weight of the 2 heads of broccoli from the U.S.? (The total weight is 24 pounds.) What symbol can we use to show which country grew more pounds of huge broccoli?" (We can use the 'greater than' symbol.) Ask a student to write the 'greater than' symbol on the chalkboard, e.g., >. Say, "What number or numbers should we write on the left side of the symbol? Explain. (14 and 10 should be written on the left side. When combined they equal 24 which is greater than 22.) How can we write 14 and 10?" (We can write 14 plus 10.) Ask a student to write it on the chalkboard on the left side of the 'greater than' symbol and to place a box on the right side of the 'greater than' symbol.

e.g.,

$$14 + 10 > \square$$

Say, "What number should be written in the box? Explain." (22 should be written in the box because 22 is less than 14 + 10 or 24. Therefore it belongs on the right.)

e.g.,

$$14 + 10 > 22$$

Say, "What do these numbers represent in the story? (A 14 pound head of broccoli plus a 10 pound head of broccoli are greater than a 22 pound head of broccoli.) We say that the statement 14 + 10 > 22 is

STRATEGY 2: cont'd

an inequality because 14 + 10 = 24 and 24 is not equal to 22."

Repeat this procedure for the Giant Onions story. Elicit responses which help the students recognize that the story of the Giant Onions is about an inequality which involves multiplication.

3.11.02.02 **solve inequalities involving addition and multiplication and write solution sets**

STRATEGY 1: Prepare a group of numeral cards numbered 0 through 9, e.g., $\boxed{0}$, $\boxed{1}$, $\boxed{2}$ ... $\boxed{9}$. On the chalkboard write: $\square < 4$. Say, "Today we will solve inequalties which involve addition and multiplication. What is an inequality? (An inequality means that something is unequal.) How are the symbols for 'greater than' or 'less than' used to show an inequality? (The numbers on one side of the symbol total either more or less than the numbers on the other side of the symbol.) What number or numbers can be written in the box on the chalkboard to make the inequality true? Explain. (Since the symbol means 'less than', any number that is less than 4 can be written in the box. Therefore 0, 1, 2, or 3 would make the inequality true.) 0, 1, 2, or 3 are all correct answers. Another name for an answer is a solution. We call the group of numbers that make an inequality true, the solution set." On the chalkboard write the solution set for $\square < 4$.

e.g.,

$$\square < 4$$

$$\text{solution set} = \{0,\ 1,\ 2,\ 3\}$$

Say, "The numbers in a solution set are always placed in braces. For a number to be placed in a solution set, it must make the statement true."

STRATEGY 1: cont'd

On the chalkboard write an inequality involving addition, e.g., $\square + 6 < 13$. Say, "How can we determine what number or numbers to include in the solution set to make this statement true? (We must determine which number or numbers plus 6 total less than 13.) Does 8 + 6 total less than 13? (No, 8 plus 6 equals 14.) Does 7 + 6 total less than 13? (No, 7 plus 6 equals 13.) Can you now indicate the numbers that belong in the solution set for $\square + 6 < 13$? Explain." (If 7 + 6 equals 13, then any number that is less than 7 may be included in the solution set. Therefore 0, 1, 2, 3, 4, 5, and 6 are included in the solution set.) Ask a student to write the solution set on the chalkboard.

e.g.,

$$\square + 6 < 13$$

$$\text{solution set} = \{0, 1, 2, 3, 4, 5, 6\}$$

Repeat this procedure for inequalilties involving multiplication, using both the < and > symbols. Ask the students to write the inequalties and the solution sets in their notebooks.

STRATEGY 2: Adapt Strategy 1, P.O. 3.11.02.01 (p.60S.1). Use multiplication.

e.g.,

$$\square \times 4 < 15$$

$$\text{solution set} = \{0, 1, 2, 3\}$$

P.O. 3.11.02.01

NAME: ______________________________ CLASS: __________ DATE: __________

Follow the directions below.

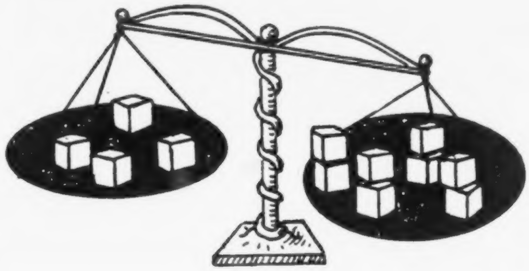
Complete each sentence by writing greater than, less than, or equal to.

The symbol, $<$ means ______________________________.

The symbol, $>$ means ______________________________.

The symbol, $=$ means ______________________________.

Fill in the circle next to the inequality which is true for each picture.

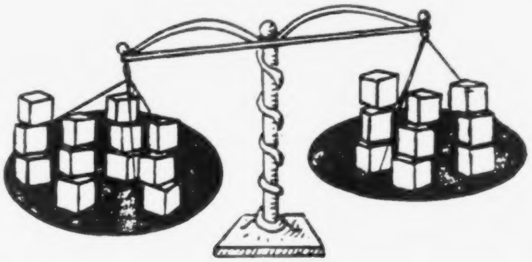


ⓐ $8 + 2 > 8$

ⓑ $8 - 4 < 12$

ⓒ $8 + 4 > 2$

ⓓ $2 + 2 < 8$



ⓔ $6 + 3 < 12$

ⓕ $12 + 1 > 9$

ⓖ $9 + 1 < 22$

ⓗ $12 + 10 < 10$

Write $>$ or $<$ in each ○ to make the statements true.

6 + 3 ○ 8

3 x 2 ○ 7

12 + 6 ○ 16

4 x 5 ○ 9

8 + 4 ○ 14

7 + 8 ○ 10

9 ○ 3 + 3

17 ○ 4 x 4

21 ○ 8 x 3

CHALLENGE! Write $>$, $<$, or $=$ in each ○ to make the statements true.

7 x 8 ○ 8 + 5

9 x 4 ○ 6 x 6

3 x 3 ○ 3 + 3

5 + 3 + 9 ○ 18

4 x 8 ○ 8 x 4

6 + 2 + 6 ○ 10 + 3 + 1

P.O. 3.11.02.02

NAME: ____________________ CLASS: __________ DATE: ________

Follow the directions below.

Circle the numbers which belong in the solution set for each inequality. Then write the solution set.

①

$\square + 8 < 12$

[✓ 0] , [✓ 1] , [✓ 2] , [✓ 3] , 4 , 5 , 6 , 7 , 8 , 9

solution set = $\{ 0, 1, 2, 3 \}$

②

$\square + 8 < 9$

0 , 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9

solution set = $\{ \quad \}$

③

$6 \times \square < 36$

0 , 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9

solution set = $\{ \quad \}$

④

$\square \times 5 < 20$

0 , 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9

solution set = $\{ \quad \}$

⑤

$3 \times \square < 15$

0 , 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9

solution set = $\{ \quad \}$

⑥

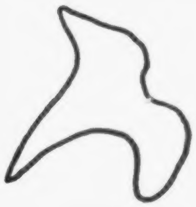
$\square + 7 < 16$

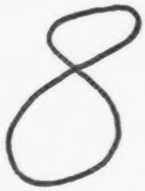
0 , 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9

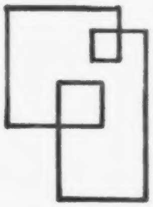
solution set = $\{ \quad \}$

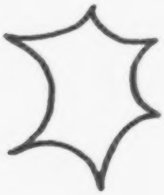
Do you remember?

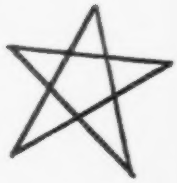
Describe each closed curve by writing simple or complex.











SHARPENING YOUR SKILLS

Units 51,52,53

Name: ____________________ Class: __________ Date: __________

1. Multilply.

8	9	9	8
x2	x5	x7	x6
☐	☐	☐	☐

3 x 9 = ☐
6 x 9 = ☐
5 x 8 = ☐
9 x 8 = ☐

2. Write the missing factors and products.

4

7 x 8 = 8 x ☐ = ☐
4 x ☐ = 9 x 4 = ☐
☐ x 3 = 3 x 8 = ☐
0 x 8 = ☐ x 0 = ☐

3. Eight baseball teams played ball in Flushing Meadow Park. There were 9 players on each team. How many players were there in all?

There were ______ players in all.

4. Divide and check.

	check
27 ÷ 9 = ☐	__ x __ = __
40 ÷ 8 = ☐	__ x __ = __
24 ÷ 8 = ☐	__ x __ = __
☐ 9)72	__ x __ = __
☐ 9)18	__ x __ = __

5. Which of the following best describes the inequality:

3 + 4 < 9 ?

Ⓐ Three plus four is greater than nine.
Ⓑ Three plus four is less than nine.
Ⓒ Nine is less than three plus four.
Ⓓ Three plus four is equal to nine.

6. Which is the solution set for

☐ x 8 < 16?

Ⓔ {0, 1}
Ⓕ {0, 1, 2}
Ⓖ {0, 1, 2, 3}
Ⓗ {0, 1, 2, 3, 4}

3.04.08 MULTIPLICATION OF TENS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.04.08.01A multiply ten (10) by the numbers one (1) through nine (9) using vertical and horizontal formats;

e.g.,

$$\begin{array}{r}10\\ \underline{x1}\\ 10\end{array} \qquad \begin{array}{r}10\\ \underline{x2}\\ 20\end{array} \qquad \begin{array}{r}10\\ \underline{x3}\\ 30\end{array}$$

1 x 10 = 10

2 x 10 = 20

3 x 10 = 30

*3.04.08.02A apply the commutative property of multiplication to the ten times table;

e.g.,

$$\begin{array}{rcrcl}6 & x & 10 & = & 60\\ 10 & x & 6 & = & \boxed{}\\ 6 & x & 10 & = & 10 \ x \ 6\\ 10 & x & 6 & = & 6 \ x \boxed{}\end{array}$$

3.04.08.03A apply the associative property of multiplication to the ten times table;

e.g.,

$$\begin{array}{rcl}(2 \ x \ 3) \ x \ 10 & = & 2 \ x \ (3 \ x \ 10)\\ 6 \ x \ 10 & = & 2 \ x \ 30\\ 60 & = & 60\end{array}$$

3.04.08.04B

use the distributive property of multiplication over addition with multiples of ten which are less than 100, by 2 through 9;

e.g.,

$$\begin{aligned} 4 \times 20 &= 4 \times (10 + 10) \\ &= (4 \times 10) + (4 \times 10) \\ &= 40 + 40 \\ &= 80 \end{aligned}$$

3.04.08.05B

multiply multiples of ten by 2 through 9.

e.g.,

$$\begin{array}{r} 20 \\ \underline{\times 2} \\ 40 \end{array} \qquad 2 \times 20 = 40$$

VOCABULARY

TERMS

product	associative
commutative	distributive

GETTING STARTED 1:

Prepare and distribute cubes (chips, sticks) to each student or group of students.

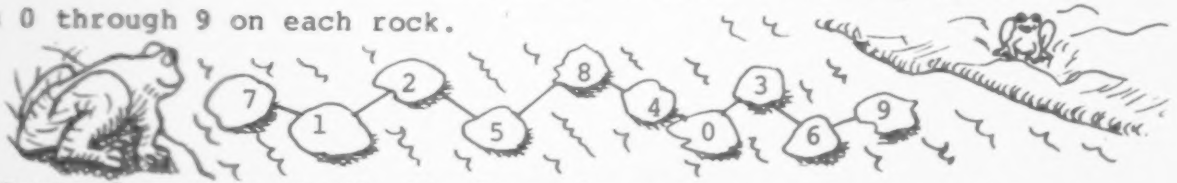
Say, "Place 1 chip on your desk. How many groups do you have on your desk? (There is 1 group on my desk.) How many cubes are in the group? (There is 1 cube in the group.) What multiplication sentence tells about this group? (1 x 1 = 1) Explain." (1 group with 1 cube in the group equals 1 cube in all.) Ask a student to write the number sentence on the chalkboard which represents this idea as the other students write it in their notebooks, e.g., 1 x 1 = 1. Ask another student to write it another way, e.g., $\begin{array}{r} 1 \\ \times\ 1 \\ \hline 1 \end{array}$.

Repeat this procedure through 9 groups of 1.

GETTING STARTED 2:

Prepare a chalkboard display of a frog sitting on the bank of a river. In the river place 10 rocks connected by a line. Randomly write the digits 0 through 9 on each rock.

e.g.,



Say, "Pretend you are Freddy the Frog who wants to play with his friend Phil, across the river. To cross the river you must know how to multiply by 2. Multiply the digit on each rock by 2. If you make a mistake you will fall into the river and will have to start over again. Jump onto the first rock. Say and solve a multiplication sentence that will keep you from falling into the water." (7 x 2 = 14) Point to each rock as Freddy the Frog crosses the river.

Repeat this procedure with the other students and other multiplication facts.

3.04.08

3.04.08.01 multiply ten (10) by the numbers one (1) through nine (9) using vertical and horizontal formats

STRATEGY 1: Prepare 100 cubes (discs, sticks) for each group of students. Ask the students to fold a sheet of lined paper lengthwise and write x 1 on the left and x 10 on the right.

e.g.,

x 1	x 10

Say, "Place 1 cube in the center of your desk. What multiplication sentence describes this cube?" (One times one equals one.) Ask a student to write 1 x 1 = 1 on the chalkboard. Say, "In 1 x 1 = 1 what does the first factor tell us? (The first factor tells us the number of groups.) What does the second factor tell us? (The second factor tells us the number in each group.) What does the product tell us? (The product tells how many cubes there are in all.) What does 1 x 1 = 1 mean if we are describing the cube on your desk?" (One group with one cube in the group equals one cube in all.) Ask the students to write 1 x 1 = 1 on the left side of their folded paper.

e.g.,

x 1	x 10
1 x 1 = 1	

STRATEGY 1: cont'd

Say, "Place a group of 10 cubes in the center of your desk. How many groups are there? (There is 1 group.) How many cubes are in this group? (There are 10 cubes in this group.) How many cubes are there in all? (There are 10 cubes in all.) What multiplication sentence describes this group?" (One times ten equals ten.) Ask a student to write 1 x 10 = 10 on the chalkboard as the other students write it on the right side of their folded papers under 'x 10'.

e.g.,

x 1	x 10
1 x 1 = 1	1 x 10 = 10

Repeat this procedure for 2 x 1 = 2 and 2 x 10 = 20 through 9 x 1 = 9 and 9 x 10 = 90. Say, "What is the same about the number sentences on the left and the right sides of the page? (They are all multiplication sentences. The products are equal to the second factor in each example.) What is different about these number sentences? (The number sentences on the left are about groups of 1. The number sentences on the right are about groups of 10. The products on the left are 1-digit products. The products on the right are 2-digit products and all have a zero.) What is a rule for multiplication when one of the factors is 10?" (When multiplying, and one of the factors is 10, the product is equal to the other factor with a zero added to it.) Ask the students to write the examples vertically next to the horizontal examples.

3.04.08

STRATEGY 1: e.g.,
cont'd

x 1	x 10
1 x 1 = 1 $\begin{array}{r}1\\ \times 1\\ \hline 1\end{array}$	1 x 10 = 10 $\begin{array}{r}10\\ \times 1\\ \hline 10\end{array}$
2 x 1 = 2 $\begin{array}{r}1\\ \times 2\\ \hline 2\end{array}$	2 x 10 = 20 $\begin{array}{r}10\\ \times 2\\ \hline 20\end{array}$

Note: Some students may see the extension of this concept through 2-, 3- or 4-digit numbers, e.g., 42 x 10 = 420, 368 x 10 = 3,680 ...

STRATEGY 2: Prepare a deck of playing cards, removing all tens, Jacks, Queens, and Kings. Place one or more cards face down in front of each student or group of students. Ask the students to count by 10 in unison. Say, "If 1 group of 10 equal 10, what do 2 groups of 10 equal? (2 groups of 10 equal 20.) ... 3 groups of 10? (3... equal 30.) Say, "You will turn over a card and say a multiplication sentence which includes the number on the card as the first factor and 10 as the second factor. For example, if you turn over a 3, you would say 3 x 10 = 30." As each number sentence is recited ask the students to write it in both vertical and horizontal formats in their notebooks as a student records it on the chalkboard. e.g.,

4 x 10 = 40 $\begin{array}{r}10\\ \times 4\\ \hline 40\end{array}$

2 x 10 = 20 $\begin{array}{r}10\\ \times 2\\ \hline 20\end{array}$

3.04.08.02 **apply the commutative property of multiplication to the ten times table**

STRATEGY 1: Adapt Strategy 3.04.05.03, P.O. 1 (p. 45S.5).

3.04.08

3.04.08.03 **apply the associative property of multiplication to the ten times table**

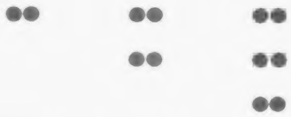
STRATEGY 1: Prepare and distribute discs to each group of students. On the chalkboard write an addition example and a multiplication example having 3 addends and 3 factors respectively.

e.g.,

$$(2 + 4) + 6 = \square \qquad 3 \times (2 \times 4) = \square$$

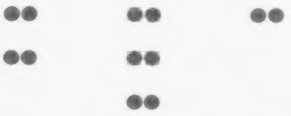
Say, "What do the parentheses in these examples tell us? (The parentheses tell us to add or to multiply the numbers within the parentheses first and then complete the example.) What would we do if the parentheses were moved and placed around 4 + 6 or 2 x 4? (We would add 4 + 6 first or multiply 2 x 4 first.) Ask the students to use their discs to show 2 + 4 + 6.

e.g.,



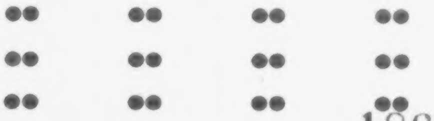
Say, "What is the sum if we add 2 + 4 first and then add 6?" (The sum is 12.) Ask the students to use their discs to show 4 + 6 + 2.

e.g.,



Say, "What is the sum if we add 4 + 6 first and then add 2? (The sum is still 12.) What is the rule? (When adding, the order of the addends will not change the sum.) Let's see if this is true for multiplication." Ask the students to use their discs to show (3 x 2) x 4.

e.g.,



STRATEGY 1:
cont'd

Say, "What does this arrangement show? (This arrangement shows 3 groups of 2 four times.) How many discs are shown in all? (There are 24 discs shown in all.) What numbers were multiplied first? (3 x 2 were multiplied first.) On the chalkboard write: 3 x (2 x 4) = ☐. Say, "Use your discs to show this number sentence. What numbers will you display first? Explain." (2 x 4 will be displayed first because 2 x 4 is in the parentheses.)

e.g.,

●●●●

●●●●

2 x 4

Say, "How can we complete this number sentence using our discs?" Ask the students to demonstrate.

e.g.,

●●●● ●●●● ●●●●

●●●● ●●●● ●●●●

3 x (2 x 4) = 24

Say, "How many discs are shown in all? (24 discs are shown in all.) The placement of the parentheses did not change the product. This is called the associative property of multiplication." On the chalkboard write: (3 x 2) x 4 = 3 x (2 x 4). Ask a student to multiply the numbers on each side of the equal symbol, reciting the factors and products as they are written. Ask the other students to record this in their notebooks.

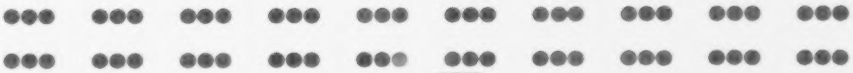
e.g.,

(3 x 2) x 4 = 3 x (2 x 4)
6 x 4 = 3 x 8
24 = 24

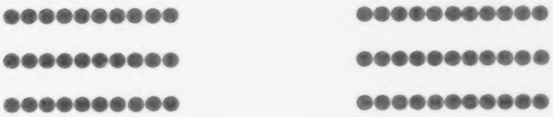
Repeat this procedure for multiplication of the ten times table.

3.04.08

STRATEGY 1: e.g.,
cont'd



$$(2 \times 3) \times 10 = \square$$
$$6 \times 10 = 60$$



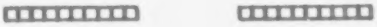
$$2 \times (3 \times 10) = \square$$
$$2 \times 30 = 60$$

$$(2 \times 3) \times 10 = 2 \times (3 \times 10)$$
$$6 \times 10 = 2 \times 30$$
$$60 = 60$$

3.04.08.04 **use the distributive property of multiplication over addition with multiples of ten which are less than 100, by 2 through 9**

STRATEGY 1: Prepare and distribute squared material (hundreds and tens) to each student or group of students. On the chalkboard, write the expression: 3 x 20. Ask a student to read the example aloud. Say, "We will use our squared material to find the product." Ask the students to use their squared material to represent 20.

e.g.,



Say, "How did you represent 20? (We represented 20 with 2 tens.) What is another name for 20? (Another name for 20 is 10 plus 10.) We will rename 20 in our example." Continue the expression on the chalkboard.

e.g.,

$$3 \times 20 = 3 \times (10 + 10)$$

188

STRATEGY 1:
cont'd

Say, "To find the product, how many times must we show 20, or as we renamed it, 10 plus 10? (We must show it 3 times.) Since we have represented 20 as 10 plus 10, we must show each ten 3 times." Ask the students to show this using their squared material.

e.g.,

Say, "We multiplied both tens 3 times. We can write about this in our example." Continue the expression on the chalkboard.

e.g.,

$$\begin{aligned} 3 \times 20 &= 3 \times (10 + 10) \\ 3 \times 20 &= (3 \times 10) + (3 \times 10) \end{aligned}$$

Say, "How can we find the product? (We can count all the tens or we can add the two groups of tens.) We will add the two groups of tens. How much is 3 times 10? (3 times 10 equals 30.) Since we multiplied 3 times 10 twice we can add the two products, 30 plus 30. How much is 30 plus 30? (30 plus 30 is 60.) Continue the expression on the chalkboard and ask the students to write it in their notebooks.

e.g.,

$$\begin{aligned} 3 \times 20 &= 3 \times (10 + 10) \\ 3 \times 20 &= (3 \times 10) + (3 \times 10) \\ 3 \times 20 &= \underbrace{30 \quad + \quad 30} \\ 3 \times 20 &= \qquad 60 \end{aligned}$$

Say, "How did we multiply 3 times 20? (We thought of 20 as 10 plus 10. We multiplied each 10 by 3 and added the products together.) This is called the distributive property of multiplication over addition."

Repeat this procedure with other multiples of ten. Students should rename the product using hundreds and tens if the product is a 3-digit number.

3.04.08

3.04.08.05 multiply multiples of 10 by 2 through 9

STRATEGY 1: Prepare a place value chart on the chalkboard. Write 60 on it, e.g.,
x3

hundreds	tens	ones
	6	0
	x	3

Say, "How many ones are there in the ones place in 60? (There are 0 ones in the ones place in 60.) How many tens are in 60? (There are 6 tens in 60.) When multiplying 60 by 3, in what order do we multiply the numbers? (First we multiply the ones and then we multiply the tens.) Ask a student to complete the example on the place value chart, e.g.,

$$\begin{array}{r}60.\\ \underline{\times\ 3}\\ 180\end{array}$$

Say, "How many ones are in the ones place of the product? (There are 0 ones.) How many tens are there? (There are 18 tens.) What is another way to say 18 tens? (18 tens equal 1 hundred plus 8 tens or 180 ones.) What is the product of 3 times 60?" (The product is 180.) Repeat this procedure with other numbers.

e.g.,

5 x 30 = 150, 6 x 80 = 480, 3 x 70 = 210

Say, "What is the same about the products of 3 x 60, 5 x 30, 6 x 80, and 3 x 70? (The products all have a zero in the ones place.) What is the same about the factors?" (One of the factors has a zero in the ones place.) Elicit from the students that an easy or fast way to multiply multiples of 10 is to drop the zero, multiply the basic fact and then add the zero to the product, e.g., 3 x 60 becomes 3 x 6 = 18. Add the zero and 3 x 60 = 180.

Repeat this procedure using several examples which the students should record in their notebooks under the heading: Multiplying by Multiples of 10.

STRATEGY 2: Prepare word problems involving multiples of 10.

e.g.,

> Five classes went on a trip to the Brooklyn Academy of Music to see a performance of Rumplestilskin. There were 30 students in each class. How many students saw Rumplestilskin?

Say, "What do we want to find? (We want to find the number of students who went to see Rumplestilskin.) How many classes went to the Brooklyn Academy of Music? (5 classes went.) How many students were there in each class? (There were 30 students in each class.) How can we solve this problem? Explain". (Since there were 5 classes with 30 students in each class, we can multiply.) Ask a student to write and label a multiplication example on the chalkboard.

e.g.,

30 students in each class
x 5 classes
☐ students in all

Say, "We have learned several ways to solve this problem. How did you solve it?" Accept all reasonable responses, e.g., distributive property of multiplication, conventional multiplication beginning in the ones place and ending in the tens place, multiplying 5 x 3 = 15 and adding a zero to get 150.

Review the third method as per Strategy 1 in which a fast way to multiply by multiples of 10 is stressed.

e.g.,

30	Drop the zero from 30.
x 5	Multiply 5 x 3 which equals 15.
150	Place the zero in the ones place.
	Therefore 5 x 30 = 150.

P.O. 3.04.08.01-.02

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

Solve the examples in 1-4 by writing a number in each box.

①

$8 \times 10 = \boxed{}$

$5 \times 10 = \boxed{}$

$1 \times 10 = \boxed{}$

$7 \times 10 = \boxed{}$

②

$$\begin{array}{r} 10 \\ \times\ 2 \\ \hline \boxed{} \end{array} \qquad \begin{array}{r} 10 \\ \times\ 6 \\ \hline \boxed{} \end{array} \qquad \begin{array}{r} 10 \\ \times\ 4 \\ \hline \boxed{} \end{array}$$

③

$4 \times 10 = \boxed{}$

$\boxed{} \times 4 = \boxed{40}$

$4 \times 10 = \boxed{} \times 4$

④

$9 \times 10 = 10 \times \boxed{}$

$10 \times \boxed{} = 8 \times 10$

$\boxed{} \times 6 = 6 \times 10$

⑤ Complete the number patterns.

10, 20, 30, ___, 50, ___.

50, 60, ___, ___, ___, 100.

⑥ Complete the sentences.

If 4 x 10 = 40, then 10 x 4 = ____.

If 10 x 7 = 70, then 7 x 10 = ____.

If 1 x 10 = 10, then 10 x 1 = ____.

Solve the problems.

⑦ Janie had 8 dimes in her pocket.

Eight dimes = ____ cents.

⑧ Every floor of a building is 10 feet higher than the floor below it. How high is the sixth floor?

The sixth floor is ____ feet high.

P.O. 3.04.08.03 - .04

NAME: ______________________ CLASS: __________ DATE: ________

Find an example in the first column which has the same product as an example in the second column. Complete each sentence in the third column.

1. (6 x 4) x 10	a. 7 x (10 x 3)	Number 1 and letter ___ have the same product.
2. 6 x 70	b. 10 x (2 x 6)	Number 2 and letter ___ have the same product.
3. (7 x 10) x 3	c. 4 x (10 + 10 + 10 + 10)	Number 3 and letter ___ have the same product.
4. 4 x (5 x 10)	d. 6 x (10 + 10 + 10 + 10 + 10)	Number 4 and letter ___ have the same product.
5. 9 x 20	e. 8 x (10 + 10 + 10)	Number 5 and letter ___ have the same product.
6. (10 x 2) x 6	f. (3 x 9) x 10	Number 6 and letter ___ have the same product.
7. 3 x (10 x 9)	g. (4 x 5) x 10	Number 7 and letter ___ have the same product.
8. 6 x 50	h. (10 x 6) x 7	Number 8 and letter ___ have the same product.
9. (8 x 10) x 4	i. 10 x (8 x 4)	Number 9 and letter ___ have the same product.
10. 4 x 40	j. 9 x (10 + 10)	Number 10 and letter ___ have the same product.

P.O. 3.04.08.05

NAME: ____________________ CLASS: __________ DATE: ________

Solve the problems below.

①

20	40	60	80
x 6	x 4	x 6	x 7
$\boxed{120}$	☐	☐	☐

②

7 x 50 = $\boxed{350}$

3 x 30 = ☐

2 x 90 = ☐

4 x 80 = ☐

③

20 x 2 = 2 x $\boxed{20}$ = $\boxed{40}$

50 x 9 = ☐ x 50 = ☐

☐ x 7 = 7 x 30 = ☐

60 x ☐ = 5 x 60 = ☐

④

30 x 7 •	• 630
70 x 9 •	• 450
80 x 4 •	• 210
90 x 5 •	• 320

⑤ Each ferry going to Bear Mountain State Park carried 70 students. If there were 4 ferries, how many students went to the park?

____ students went to the park.

⑥ 60 students went fishing in the Hudson River. They each brought 2 fish home. How many fish were brought home in all?

____ fish were brought home.

Do you remember?

132 students rented bicycles at the park. 58 students rented rowboats. How many fewer students went rowing than bicycling?

____ fewer students went rowing.

4 boys shared food for the picnic. Phil spent $14.85. Dave spent $6.08. Chuck spent $10.90. Hal spent $2.00. How much money did the 4 boys spend on the picnic?

The boys spent ________ on the picnic.

3.13.03 PATTERNS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.13.03.01A complete a numerical pattern and state the rule for the pattern;

e.g.,

1, 4, 7, 10, ☐ (add 3)
20, 16, 12, 8, ☐ (subtract 4)

3.13.03.02A arrange numbers to form a pattern and state the rule for the pattern.

e.g.,

Arrange the following numbers to form a pattern. State the rule.

10, 5, 20, 15, 25, 40, 30, 35

__, __, __, __, __, __, __, __,

Rule: ____________________

VOCABULARY

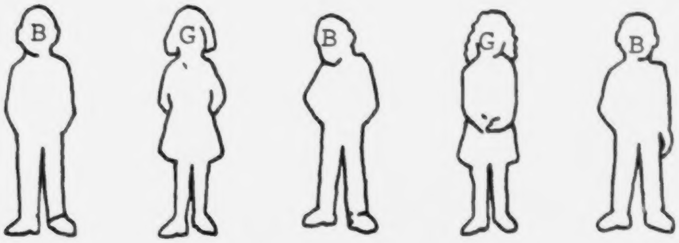
TERMS

pattern

GETTING STARTED 1:

Ask 5 students to stand in the front of the classroom in the order in which they are called. Alternate boy, girl, boy, girl, boy. Say, "If we ask another student to join the group, would we ask a boy or a girl? (We would ask a girl.) Explain. (The pattern is: boy girl, boy girl.) How could we write this pattern on the chalkboard?" Ask several students to come to the chalkboard and demonstrate. Accept all reasonable responses.

e.g.,



boy, girl, boy, girl, boy,
B, G, B, G, B,

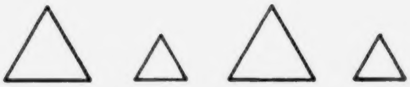
Ask a boy to join the group. Ask the students at the chalkboard to add to their patterns to include the new addition.

Repeat this procedure with other patterns using concrete objects.

GETTING STARTED 2:

Prepare an overhead projector and large and small triangles, circles, and squares in red, yellow, and blue. Say, "I will place several shapes on the projector in a pattern."

e.g.,



Say, "What pattern do you see? (We see a large triangle, a small triangle, a large triangle, a small triangle.) What should come next?

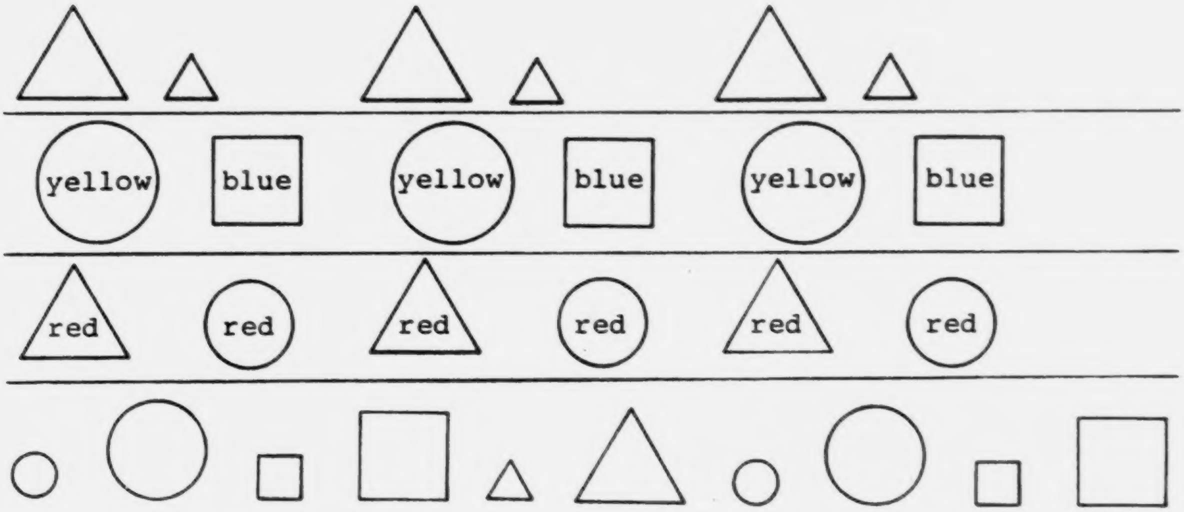
GETTING STARTED 2: cont'd

Explain." (There should be a large triangle next because that will keep the pattern going.) Ask the students to copy the pattern in their notebooks under the title: Patterns with Shapes.

Repeat this procedure alternating colors and shapes. Ask the students to use the shapes to explore other possibilities. Ask them to explain the patterns that their classmates have established and add them to their list of patterns.

e.g.,

Patterns with Shapes

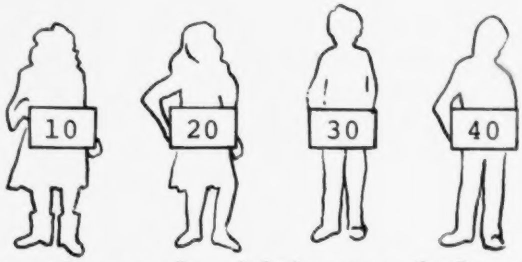

yellow
blue
yellow
blue
yellow
blue
red
red
red
red
red
red

3.13.03

3.13.03.01 **complete a numerical pattern and state the rule for the pattern**

STRATEGY 1: Prepare a group of number cards numbered from 0 through 100. Shuffle and distribute them randomly, so that each student has approximately four cards. Ask the students with numbers 10, 20, 30, and 40 to arrange themselves in order from the lowest to the highest number.

e.g.,



Distribute the cards which were left at the desks of the standing students, to the other students. Say, "Who has the number which should come next?" (50 comes next.) Ask the student with the card marked 50 to place him/herself in the line. Say, "Why do you think your answer is correct?" (I see a pattern. We are counting by tens or adding ten to each number.) On the chalkboard write:

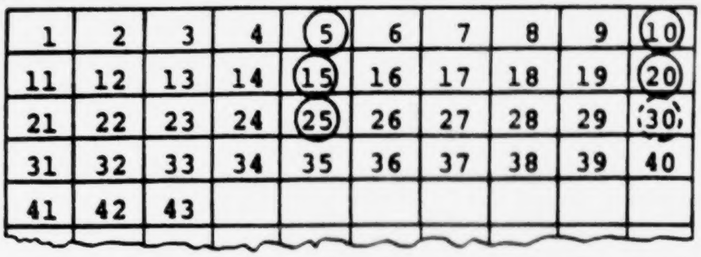
Patterns	**Rules**
10, 20, 30, 40, 50	Adding 10.
42, 44, 46, 48, 50	Adding 2.
55, 50, 45, 40, 35	Subtracting 5.

As an alternative, ask the students to determine patterns which will be completed by their classmates or to state rules and ask their classmates to create patterns.

STRATEGY 2: Prepare and display a hundreds chart. Ask a student to circle the multiples of five from 5 through 25. Ask a student to circle the number which comes next in the pattern.

STRATEGY 2:
cont'd

e.g.,

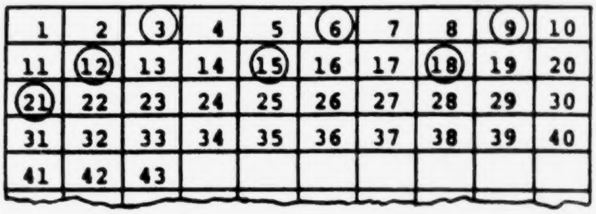


1	2	3	4	⑤	6	7	8	9	⑩
11	12	13	14	⑮	16	17	18	19	⑳
21	22	23	24	㉕	26	27	28	29	㉚
31	32	33	34	35	36	37	38	39	40
41	42	43							

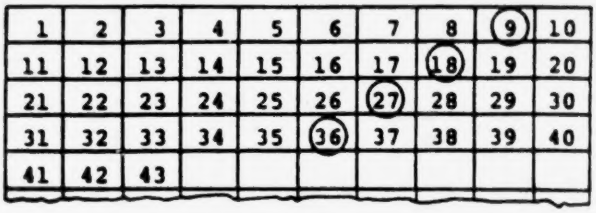
Say, "Why did you circle 30? (Thirty comes next because we are counting by fives.) How can this group of numbers be written another way to show counting by fives?" Ask a student to demonstrate. e.g.,

5, 10, 15, 20, 25, 30

Say, "What other number patterns appear on the hundreds chart?" Ask several students to demonstrate by circling the patterns, each in a different color. e.g.,



1	2	③	4	5	⑥	7	8	⑨	10
11	⑫	13	14	⑮	16	17	⑱	19	20
㉑	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43							



1	2	3	4	5	6	7	8	⑨	10
11	12	13	14	15	16	17	⑱	19	20
21	22	23	24	25	26	㉗	28	29	30
31	32	33	34	35	㊱	37	38	39	40
41	42	43							

Say, "What pattern is shown by the numbers circled in red? (This pattern shows counting by threes.) (Let's count by threes through 18. (3, 6, 9, ... 18) What number should be circled next.) (21 should be circled next.) What is the rule for this pattern?" (The rule is: Counting forward by threes.)

Repeat this procedure for the numbers circled in other colors.

3.13.03

3.13.03.02 **arrange numbers to form a pattern and state the rule for the pattern**

STRATEGY 1: Prepare several groups of flashcards numbered 0 through 50 for each group. Say, "We have looked at number patterns, completed them, and stated the rule for the patterns. Today we will arrange numbers to form a pattern and then state the rule. How can we form a pattern? (We can decide on a rule and then arrange the numbers to fit the rule, e.g., Add 4. 0, 4, 8, 12, 16.) Is there another way to form a pattern? (We can look at a group of numbers and arrange them in various ways until we have formed a pattern and then write the rule for the pattern, e.g., 40, 35, 30, 25. Subtract 5.)

Distribute the groups of cards to groups of students. Ask the students to assign a name to their group. Ask one member of each group to write their group's name on a paper and display it on their table. Say, "Work together. Select cards and arrange them to form a pattern. On a piece of paper, write the rule for your pattern." When all the groups have arranged their patterns and written their rules say, "One member of each group will visit 1 other group, write the name of that group and the numbers they have arranged."
e.g.,

Hawks: 30, 28, 26, 24, _____, _____, _____

Say, "That person will return to his/her own group, and with the other group members, will determine the rule for the pattern and complete the pattern.
e.g.,

Hawks: 30, 28, 26, 24, 22, 20, 18
Rule : Subtracting 2 or counting backward by 2.

STRATEGY 1: cont'd

Say, "When you have completed one pattern and determined the rule, send another student to another group to repeat this activity." The number of patterns each group now has should equal the number of groups that have been formed. The winning group is the one which has determined the correct rule for the greatest number of patterns.

More able students may form 2-operation patterns. Say, "Sometimes a pattern requires more than 1 operation to complete it." On the chalkboard write a 2-operation pattern.

e.g.,

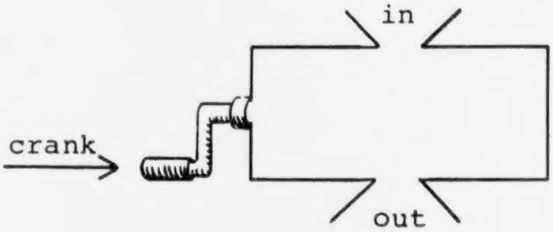
6, 3, 9, 6, 12, 9, 15, _____, _____, _____

Say, "What is the rule for this pattern? (Subtract 3, add 6.) You will now use your cards to create a 2-operation pattern."

Repeat the above procedure with each group forming a pattern, completing the patterns created by all the groups, and stating the rules.

STRATEGY 2: Draw a function machine on the chalkboard.

e.g.,



Say, "This is a function machine. What goes into the place marked, 'IN'? (A number goes into the place marked 'IN'.) What happens when we turn the crank? (At a turn of the crank a new number comes out.) This is a table of what has happened as we put numbers into the machine."

STRATEGY 2: cont'd

e.g.,

IN	1	2	3	4
OUT	3	4	5	

Say, "What do you think will happen when a 4 is put into the machine? (A 6 will come out.) How did you determine that a 6 will come out? (The table shows that for each number that went in, the number that came out was 2 more than that number.) What would be a good name for this machine? (A good name for this machine would be the Plus 2 Machine.)

Repeat this procedure with other function machines. Ask the students to create a function machine to arrange numbers to form a pattern and then to state the rule using another operation.
e.g.,

IN	15	12	9	6	3
OUT	12	9	6	3	

A good name for the machine which helped create this chart would be the Subtract 2 Machine.

P.O. 3.13.03.01

NAME: ____________________ CLASS: __________ DATE: ________

Follow the directions below.

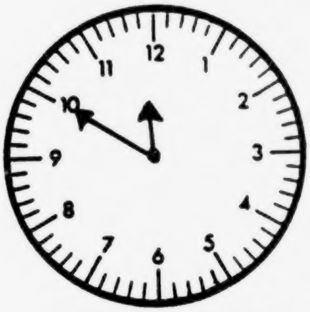
Complete the patterns and write the rule.

			Rule
0, 1, 2, 3, 4,	5	6	Counting by ones. Add 1.
20, 18, 16, 14, 12,			
0, 5, 10, 15, 20,			
42, 36, 30, 24, 18,			
18, 27, 36, 45, 54,			

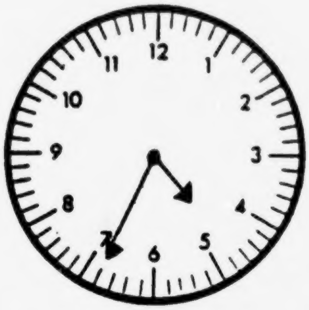
Read the rule. Form a pattern for the rule.

Rule					
Add 4.	8	12	16	20	24
Counting backward by 10.					
Subtract 2.					
Counting forward by 7.					

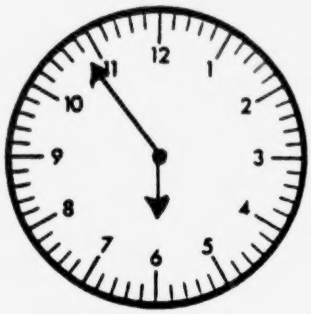
Do you remember?



___ minutes before ___



___ minutes of ___



___ minutes to ___

P.O. 3.13.03.02

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

Arrange each group of numbers to form a pattern. Then write the rule.

Ⓐ 5, 20, 30, 10, 25, 15 Rule: Counting by fives;

5, 10, 15, 20, 25, 30 Adding 5

Ⓑ 15, 9, 21, 18, 12, 24 Rule: ______________

___, ___, ___, ___, ___, ___ ______________

Ⓒ 36, 24, 30, 54, 48, 42 Rule: ______________

___, ___, ___, ___, ___, ___ ______________

Ⓓ 24, 48, 32, 56, 40, 16 Rule: ______________

___, ___, ___, ___, ___, ___ ______________

CHALLENGE! What is the pattern?

The third number must be odd.
The second number must be double the first.
The last number must be less than 30.
The fourth number must equal 10 + 10.

☐ ☐ ☐ ☐ ☐

Rule: ______________________________

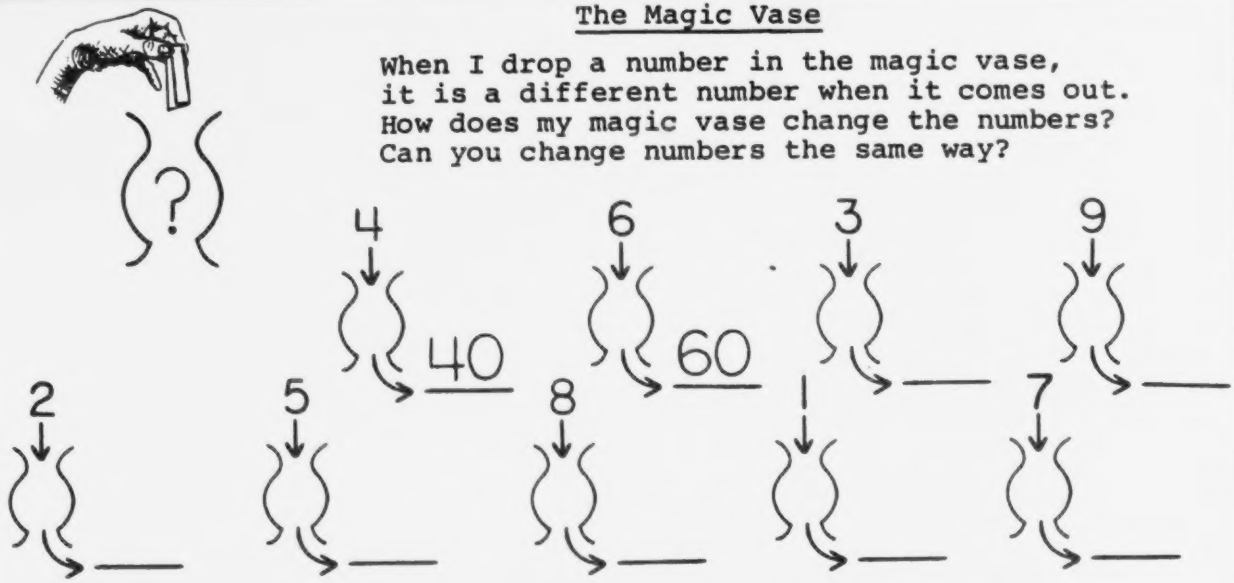
SHARPENING YOUR SKILLS

Units 54, 55

Name: ______________________ Class: ____________ Date: __________

The Magic Vase

When I drop a number in the magic vase,
it is a different number when it comes out.
How does my magic vase change the numbers?
Can you change numbers the same way?



What did my magic vase do? ________________________________

Complete the pattern. Write the rule.

9, 12, 15, 18, ____, ____

Rule: ______________________

____

50, 45, 40, 35, ____, ____

Rule: ______________________

____

Rearrange each group of numbers to make a pattern.

80, 20, 100, 40, 60

____, ____, ____, ____, ____

12, 20, 8, 24, 16

____, ____, ____, ____, ____

Write the missing numbers.

$$(2 \times 4) \times 10 = 2 \times (4 \times 10)$$

$$\boxed{} \times 10 = \boxed{} \times \boxed{}$$

$$\boxed{} = \boxed{}$$

Unit 56

3.04.09 PATTERNS IN MULTIPLICATION TABLES
THROUGH 10 x 10

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*3.04.09.01A fill in a multiplication table from 0 x 0 through 10 x 10; e.g.,

X	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

*3.04.09.02A find patterns in multiplication tables from 0 x 0 through 10 x 10. e.g.,

X	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

VOCABULARY

TERMS

multiplication table	factor
pattern	product

GETTING STARTED 1:

Write the following sequence of numbers on the chalkboard, leaving some spaces blank:
e.g.,

0, 3, 6, 9, ____, ____, 18, ____, 24, ____, ____

Say, "These numbers form a pattern. What is the rule for this pattern? (Add 3.) What numbers are needed to complete the pattern?" (12, 15, 21, 27, and 30 are needed to complete the pattern.) Ask a student to come to the chalkboard and complete the pattern as the other students say the missing numbers and write the pattern in their notebooks.

Repeat this procedure using other number patterns.

GETTING STARTED 2:

Prepare a group of multiplication flashcards which include the factors and the product, e.g., 6 x 5 = 30. Prepare cards labeled "factors" or "product". Place them face down.
e.g.,

factors   product

Say, "I will display a multiplication number sentence, e.g., 6 x 5 = 30. When I call your name, you will say the multiplication sentence. Then you will pick one of the cards. If the card says 'product', you will say the number which represents the product, e.g., 30. If the card says 'factors', you will say the numbers which represent the factors, e.g., 6 and 5."

Repeat this procedure until all the students have had an opportunity to respond.

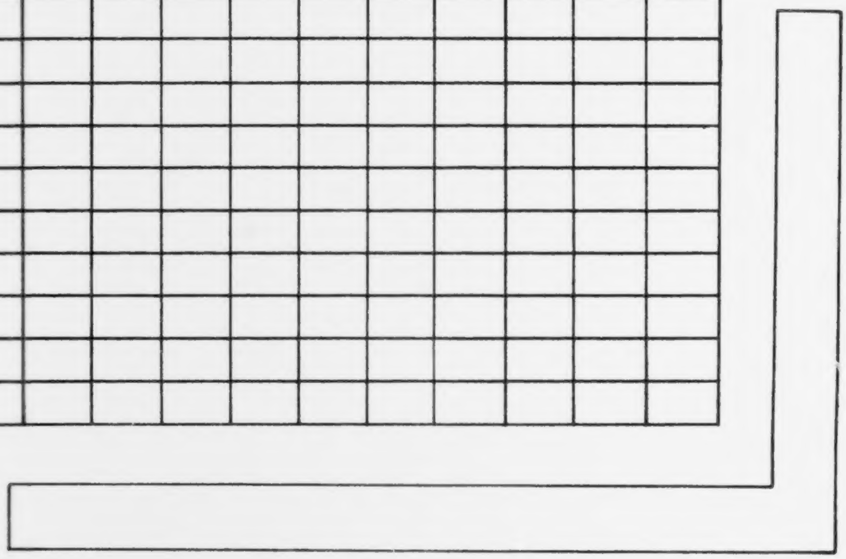
3.04.09

3.04.09.01 **fill in a multiplication table from 0 x 0 through 10 x 10**

STRATEGY 1: Prepare and distribute copies of a blank multiplication table and reverse L's. The reverse L's will be used by the students to locate factors along the columns and rows.

e.g.,

X	0	1	2	3	4	5	6	7	8	9	10
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

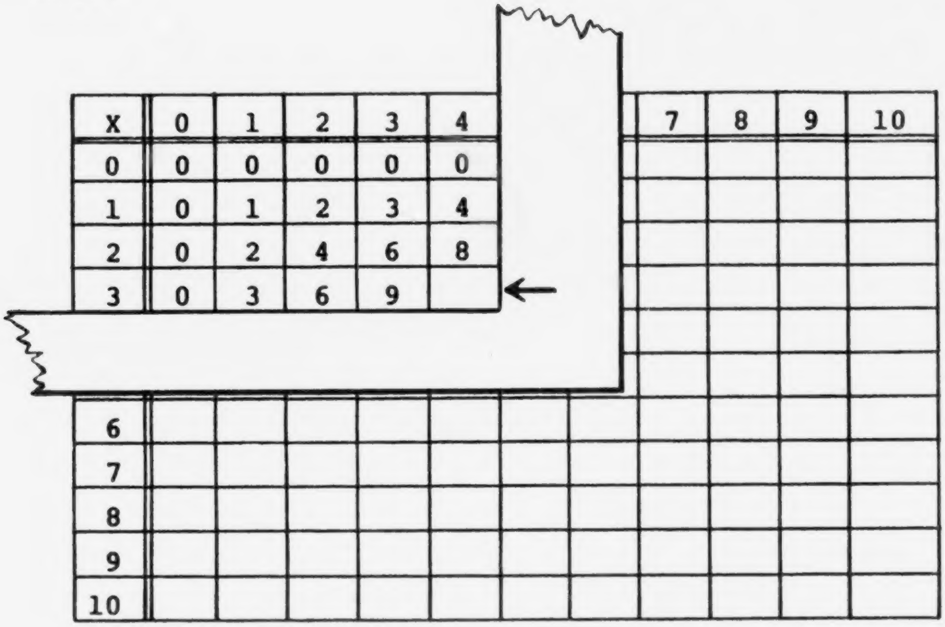


Ask a student to work at the chalkboard with a display model of the multiplication table and a large reverse L.

Say, "How can we use the reverse L to help us fill in the products on the multiplication table? (Suppose we want to find the product of 3 and 4. We can place the horizontal part of the L under one of the factors in the left column, e.g., 3, and place the vertical part of the L to the right of a factor in the top row, e.g., 4.)

3.04.09

STRATEGY 1: e.g.,
cont'd



X	0	1	2	3	4			7	8	9	10
0	0	0	0	0	0						
1	0	1	2	3	4						
2	0	2	4	6	8						
3	0	3	6	9							
6											
7											
8											
9											
10											

Say, "Where will we write the product of 4 x 3? (The product of 4 x 3 will be written in the box where the vertical and horizontal parts of the reverse L meet.) What is the product of 4 x 3? (4 x 3 = 12) If we did not know that 4 x 3 = 12, what clues on the multiplication table could help?" (We could count across by threes or down by fours and we would reach 12.)

Repeat this procedure until the students have completed the multiplication table at their desks.

3.04.09.02 **find patterns in a multiplication table from 0 x 0 through 10 x 10**

STRATEGY 1: Prepare and display a large multiplication table on the chalkboard. Distribute a copy of the table to each student. Circle several groups of numbers.

STRATEGY 1: e.g.,
cont'd

X	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Say, "Look at the numbers looped on the chart. These numbers follow a pattern. How much has been added to zero to get 3? (3 has been added to 0.) What has been added to three to get six? (3... to get 6.) What is the rule for our pattern? (Adding 3.) Where can you find this pattern in another direction on your chart. (This pattern can be found on the horizontal row; 0,3,6...30.) Loop the pattern".

Repeat this procedure with several other patterns found on the chart. Ask the students to find one pattern of their own and to explain its rule.

Note: Discovering patterns on the diagonals is a more complex process than discovering vertical and horizontal patterns. More able students will find this interesting and challenging.

STRATEGY 2: Prepare colored chalk and a large multiplication table as in Strategy 1. Distribute a copy of the table and several crayons to each student.
Ask the students to look at the multiplication table. Say, "We will search for patterns on the multiplication table in rows, columns, or diagonals." Ask

STRATEGY 2:
cont'd

several students to demonstrate the definition of rows, columns, and diagonals by drawing arrows on the chalkboard.

e.g.,

row → ←
column ↑ ↓
diagonal ↗ ↙ ↖ ↘

Ask a student to use colored chalk to trace numbers which are in a pattern, e.g., a column of zero products. Say, "How is this pattern made? (These zeros are products of the factors in the left column and the zero factors across the top.) How can you explain the column of zero products?" (When a number is multiplied by zero, the product will always be zero.)

Ask the students at their seats to use their yellow crayon to color that column ↑ and row → of zeros. Say, "Do you see other patterns?" (Yes, when you multiply a number (factor) by one, you get that same number, or factor, as a product.) Ask a student to trace that pattern of products on the multiplication table. Ask the students at their seats to use their orange crayon to color that column and row.

Repeat this procedure locating other patterns in both columns and rows.

Note: Discover and discuss patterns in the multiples of nine.

e.g.,

9, 18, 27, 36 ...

1. The sum of the digits in each number is nine.
2. The digit in the ones place decreases by 1 as the digit in the tens place increases by 1 ten with each new multiple of 9.
3. The digit in the tens place increases by 1 as each number increases.

See **Note** in Strategy 1.

P.O. 3.04.09.01

NAME: ______________________ CLASS: __________ DATE: ________

Complete each sentence below.

x	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0		0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	🐟
2	0	2		6	8	10	12	▲	16		20
3	0	3	6	9	12	☕	18	21	24		30
4	0	4	8		16	20	24	28	32	36	☺
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	🧤	42	48		60
7	0	7	14	21	🍎	35	42	49	56	63	70
8	0	8	16	24	32	40			64	♡	80
9	☆	9	18	27	36	45	54	63	🍪	81	
10	0	10	20	30	40	50	60	70	80	90	100

Complete the chart. Then write a multiplication sentence and its product for each missing number.

3 x 1 = 3

______ x ______ = ______

______ x ______ = ______

______ x ______ = ______

______ x ______ = ______

______ x ______ = ______

______ x ______ = ______

______ x ______ = ______

______ x ______ = ______

______ x ______ = ______

The ▲ is covering _____.

The ☺ is covering _____.

The 🍎 is covering _____.

The 🧤 is covering _____.

The ♡ is covering _____.

The ☕ is covering _____.

The ☆ is covering _____.

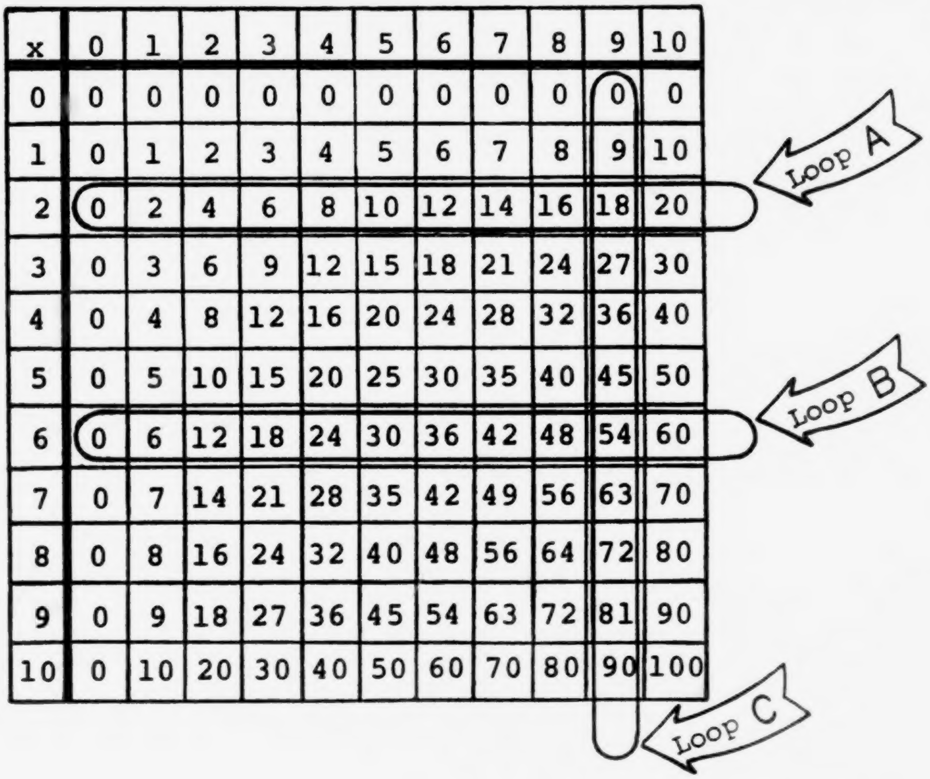
The 🐟 is covering _____.

The 🍪 is covering _____.

P.O. 3.04.09.02

NAME: ______________________ CLASS: __________ DATE: ________

Find a pattern in each of the loops.



x	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Loop A
Loop B
Loop C

Loop A ____

Loop B ____

Loop C ____

Draw loops around 3 more groups of numbers. Label the loops. Explain the patterns.

Loop D ____

Loop E ____

Loop F ____

Unit 57

3.12.03 ARRANGEMENTS - TREE DIAGRAMS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.12.03.01A list and count the number of possible arrangements in a set of objects;

e.g.,

{W, E, T}

WET TWE ETW

WTE TEW EWT

{□, ○, △}

1. □ ○ △ 3. △ ○ □ 5. ○ □ △

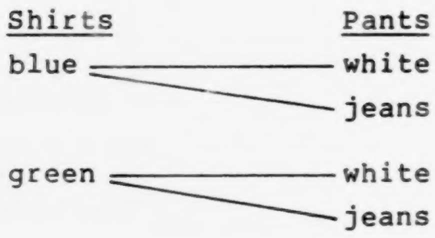
2. □ △ ○ 4. △ □ ○ 6. ○ △ □

3.12.03.02A make a tree diagram to display combinations of given data.

e.g.,

Data: blue shirt, green shirt, jeans, white pants.

How many outfits can you make?


Shirts
Pants
blue
white
jeans
green
white
jeans

4 outfits can be made.

214

VOCABULARY

TERMS

arrangements	data
tree diagram	combinations

GETTING STARTED 1:

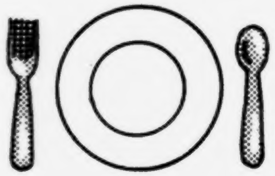
Write a multisyllable word on the chalkboard, e.g., alphabet. Say, "Using the letters in this word, write as many new words as you can. You may not use a letter more than once in your word if the letter appears only once in the word on the chalkboard. For example, you may make the word heal but not heel. Why? (There is only one e in the word, alphabet and heel has two e's.) When we make words from other words we are rearranging the letters. Sometimes we rearrange all the letters; sometimes we rearrange some of the letters."

Repeat this procedure using other multisyllable words.

GETTING STARTED 2:

Prepare a fork, a spoon, and a plate. Say, "Alex and Barbara set the table for dinner the same way every night. They place a fork to the left of the plate and a spoon to the right of the plate." Demonstrate.

e.g.,



Say, "They became bored of always setting the table the same way. How could they set the table differently using the fork, the plate, and the spoon? (They could change the order of the utensils and the plate.) We can call each setting an arrangement. What is the arrangement of the three items? (The arrangement is fork - plate - spoon.) What other arrangement might Alex and Barbara make?" (The arrangement might be plate - spoon - fork.) Ask a student to demonstrate. Say, "When we change an arrangement, what are we really doing?" (We are changing the order of the items in the arrangement.)

3.12.03

3.12.03.01 **list and count the number of possible arrangements in a set of objects**

STRATEGY 1: List 3 students' names on the chalkboard, e.g., Jose - Kathy - Thomas. Ask these students to come to the front of the classroom and line up in the order indicated on the chalkboard. Ask the other students to copy these names into their notebooks. Say, "Let's see how many ways there are for Jose, Kathy, and Thomas to be arranged." Ask a student to change the order of the three students and write the new arrangement on the chalkboard. Say, "As each new arrangement is written on the chalkboard, copy it into your notebooks. Let's make sure we aren't repeating the same order."

Repeat this procedure until the 3 students have been placed in all possible arrangements and the students have copied the arrangements into their notebooks. e.g.,

Jose - Kathy - Thomas
Jose - Thomas - Kathy
Kathy - Jose - Thomas
Kathy - Thomas - Jose
Thomas - Kathy - Jose
Thomas - Jose - Kathy

Say, "How many different arrangements can we make with three people? (We can make 6 different arrangements.) In these 6 arrangements, how many times was each student standing on the left? (Each student was standing on the left 2 times.) ... the right? (... 2 times.) ... in the middle? (... 2 times.) What can we say about arranging 3 people (objects, items)?" (When arranging 3 people, there are 6 possible arrangements. Each person will be in the same position 2 times.) Ask a student to write this statement on the chalkboard as the other students copy it into their notebooks.

STRATEGY 1: cont'd

Note: When arranging 4 or more items, the number of arrangements becomes very large, 24 or more. This should be used only with more able students.

STRATEGY 2:

Prepare and display 3 number cards, e.g., $\boxed{7}$, $\boxed{1}$, $\boxed{4}$. Say, "Here are the 3 digits in Maria's house number. They are not arranged in the correct order. Let's arrange them in all the possible ways we can. I will then give you some clues to help you determine which arrangement represents her house number." Ask the students to write the numbers in their notebooks. Say, "What is another way to arrange 7, 1, and 4? (Another arrangement is 7, 4, and 1.) Repeat this procedure until all the arrangements have been recorded on the chalkboard and in the students' notebooks.

e.g.,

All Possible Arrangements
for 7, 1, and 4

7	4	1
7	1	4
4	7	1
4	1	7
1	4	7
1	7	4

Say, "I will give you some clues to determine which arrangement represents Maria's house number. The digit in the tens place times the digit in the ones place equals 28. Which arrangements are possible? (1, 4, 7 and 1, 7, 4 are possible.) If we subtract the digit in the hundreds place from the digit in the ones place, the difference is 6. Which arrangement represents Maria's house number?" (1, 4, 7 represents Maria's house number.)

Repeat this procedure with other arrangements. Ask the students to think of appropriate clues for determining the designated arrangement.

3.12.03

3.12.03.02 **make a tree diagram to display combinations of given data**

STRATEGY 1: Prepare cutouts of two different color pants and three different color shirts. Say, "With this clothing we can make several different outfits. Today, I can wear black pants and a blue shirt. What might I wear tomorrow?" List the various combinations on the chalkboard and ask the students to copy them into their notebooks.

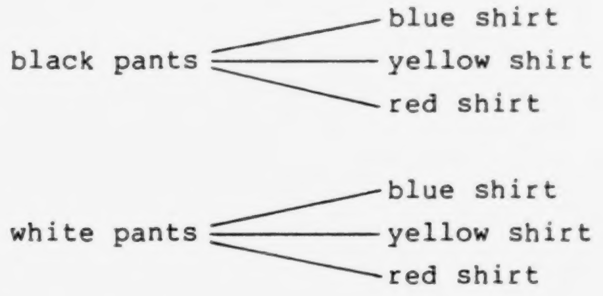
e.g.,

black pants - blue shirt

white pants - yellow shirt

When all the possible combinations have been listed, say, "How many different combinations did we make? (We made 6 different combinations.) One way to show these combinations is with a tree diagram. The colors of the pants are listed. Each pair of pants is matched with a different shirt." Draw a tree diagram on the chalkboard. Ask the students to copy it into their notebooks.

e.g.,



Say, "Why do you think this is called a tree diagram?" (It looks like branches of a tree.)

Repeat this procedure, using different data, e.g., 2 cars and 2 colors.

P.O. 3.12.03.01

NAME: ______________________________ CLASS: __________ DATE: ________

Follow the directions below.

List the arrangements for each set of items below.

{ △, □, ○ }

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________

{ 1, 5, 3, 6 }

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________
8. ____________________
9. ____________________
10. ____________________
11. ____________________
12. ____________________
13. ____________________
14. ____________________
15. ____________________
16. ____________________
17. ____________________
18. ____________________
19. ____________________
20. ____________________
21. ____________________
22. ____________________
23. ____________________
24. ____________________

CHALLENGE!

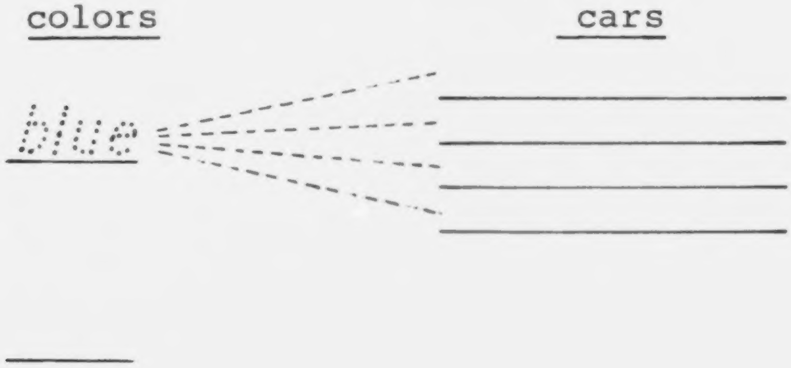
Have you seen the pattern?
The number of arrangements that can be made with 3 items is ____ or 3 x 2 x 1 = 6. The number of arrangements that can be made with 4 items is ____ or ___ x ___ x ___ x ___ = ____.
Use this formula to find the number of arrangements you can make with 5 items. ___ x ___ x ___ x ___ x ___ = ____.

P.O. 3.12.03.02

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

Fords, Cadillacs, Toyotas, and Buicks are sold in either red or blue. Make a tree diagram to show the combinations of cars and colors.



Make a tree diagram to show the combinations of shoes with socks. Use the following data:

brown shoes, red shoes

white socks, red socks, blue socks

Do you remember?

In the Olympics there were 28 swimmers from 7 different countries. If each team had an equal number of swimmers, how many swimmers were on each team?

There were ____________ swimmers on each team.

Unit 58

3.04.10 MULTIPLICATION OF 2- AND 3-DIGIT NUMBERS BY A 1-DIGIT MULTIPLIER WITHOUT REGROUPING (EXCHANGE)

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.04.10.01B multiply multiples of 100 by a 1-digit number without regrouping (exchange); e.g.,

$$\begin{array}{r} 200 \\ \times\ \ 3 \\ \hline 600 \end{array} \qquad 3 \times 200 = 600$$

3.04.10.02B multiply 2- and 3-digit numbers by numbers less than 10 in vertical and horizontal formats without regrouping (exchange); e.g.,

$$\begin{array}{r} 42 \\ \times\ 2 \\ \hline 84 \end{array} \qquad 2 \times 42 = 84$$

3.04.10.03B solve word problems related to skills learned in this module.
e.g.,

> There are 3 boxes of marbles on a desk. Each box contains 32 marbles. How many marbles are there in all?

VOCABULARY

TERMS

vertical
horizontal

GETTING STARTED 1:

Prepare and display a word problem involving basic multiplication facts.

e.g.,

> The school nurse sees 7 students a day for check-ups. If she spends 5 days on check-ups, how many students will she see?

Say, "What do we have to find? (We have to find the number of students the nurse will see in 5 days.) Does the problem give us any clues? (The nurse sees 7 students a day. She works for 5 days.) How can we solve this problem?" (We can make a table to help us determine how many students she will see.) Write a table on the chalkboard.

e.g.,

Number of days	1	2	3	4	5
Total number of students seen					

Ask several students to fill in the missing information.

e.g.,

Number of days	1	2	3	4	5
Total number of students seen	7	14	21	28	35

Say, "At the end of 5 days, how many students did she see? (She saw 35 students.) How did the table help us solve the problem? (The table helped us see how many students would have been seen in 5 days.) Making lists and charts is a very helpful way of solving problems. Is there another way we could have solved this problem?" (We could have multiplied 5 x 7 = 35.)

3.04.10

GETTING STARTED 2:

Prepare flashcards with basic multiplication and division facts. e.g.,

$\boxed{3 \times 4 = \square}$ $\boxed{12 \div 4 = \square}$

$\boxed{7 \times 6 = \square}$ $\boxed{42 \div 6 = \square}$

Divide the class into two teams to play Math Baseball. Show the first student on team A a card. If the student answers correctly, he/she goes to first base. If the student misses, the team gets an out. Team A continues until there are three outs. Then team B has its chance. The team with the most points after nine innings wins. Emphasize and elicit terminology such as product and factor during the game.

3.04.10

3.04.10.01 **multiply multiples of 100 by a 1-digit number without regrouping (exchange)**

STRATEGY 1: Prepare and distribute 10 hundreds squares to each group of students. On the chalkboard write multiplication examples with factors which are multiples of 10.

e.g.,

$$\begin{array}{r} 30 \\ \underline{\times\ 3} \end{array} \qquad 3 \times 20 = \square \qquad \begin{array}{r} 20 \\ \underline{\times\ 4} \end{array}$$

Say, "What is the same about these examples? (These examples all have a 1-digit factor and a 2-digit factor. The 2-digit factors have a zero in the ones place.) What shortcut have we learned about multiplying a 1-digit factor by a 2-digit factor where there is a zero in the ones place in one of the factors? Use one of these examples to explain." (In the example, 3 x 20 = □ , we can drop the zero in the 20, multiply 3 x 2 which equals 6, return the zero to the product by placing it in the ones place, and the product of 3 x 20 is 60.) Ask 3 students to complete the examples on the chalkboard as the other students write and complete them in their notebooks.

e.g.,

$$\begin{array}{r} 30 \\ \underline{\times\ 3} \\ 90 \end{array} \qquad 3 \times 20 = 60 \qquad \begin{array}{r} 20 \\ \underline{\times\ 4} \\ 80 \end{array}$$

On the chalkboard write multiplication examples with factors which are multiples of 100.

e.g.,

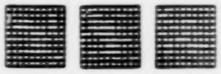
$$\begin{array}{r} 300 \\ \underline{\times\ \ 3} \end{array} \qquad 3 \times 200 = \square \qquad \begin{array}{r} 200 \\ \underline{\times\ \ 4} \end{array}$$

Say, "What is the same about these examples? (These examples all have a 1-digit factor and a 3-digit factor. The 3-digit factors have a zero in the ones place and a zero in the tens place.) What do you think will be the same about the products of these

STRATEGY 1:
cont'd

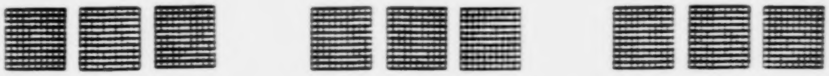
examples? (The products will have 2 zeros.) What does 3 x 300 mean? (3 x 300 means 3 groups with 300 in each group.) Use your squared material to show 1 group of 300."

e.g.,



Say, "Now add 2 more groups of 3 hundred each to show 3 groups of 3 hundred."

e.g.,



Say, "How many hundreds are there in all?" (There are 9 hundreds in all.) Ask the students to use their squared material to show the products of 3 x 200 and 2 x 400. Ask 2 students to write these products on the chalkboard as the other students write them in their notebooks. Compare these examples and their products with the group of examples having factors which are multiples of 10.

e.g.,

3 x 20 = 60 3 x 200 = 600

$$\begin{array}{r} 20 \\ \underline{\times\ 4} \\ 80 \end{array} \qquad \begin{array}{r} 200 \\ \underline{\times\ \ 4} \\ 800 \end{array}$$

Say, "Look at 3 x 20 = 60 and 3 x 200 = 600. What is the same about these examples?" (They both have factors of 3. They both have a 6 as one of the digits in the product.) Accept all other reasonable responses. Say, "What can we say about multiplying multiples of 100 by a 1-digit number? Use 3 x 200 to explain." (When multiplying 3 x 200, we can cover the 2 zeros in 200, multiply 3 x 2 which equals 6, write the 2 zeros in the product in the ones and tens places and the product of 3 x 200 is 600.)

STRATEGY 1: cont'd

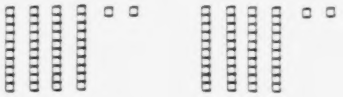
Repeat this procedure for other examples with multiples of 100 multiplied by a 1-digit factor.

3.04.10.02 **multiply 2- and 3-digit numbers by numbers less than 10 in vertical and horizontal formats without regrouping (exchange)**

STRATEGY 1:

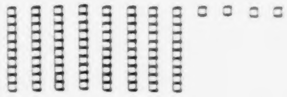
Prepare and distribute squared material to each student or group of students (ones and tens). On the chalkboard write $\begin{array}{r}42\\ \underline{\times\ 2}\end{array}$. Say, "Use your squared material to show 1 group of 42. How many tens and how many ones do we need? (We need 4 tens and 2 ones.) Now make another group of 42. How many tens and ones did we use? (We used another group of 4 tens and 2 ones.) How many groups of 42 did we make?" (We made 2 groups of 42.)

e.g.,



Say, "If we combine the tens and the ones, how much will we have? (We will have 8 tens and 4 ones.) What do 8 tens and 4 ones equal?" (8 tens and 4 ones equal 84.)

e.g.,



Say, "Look at the example, 2 times 42, which is written on the chalkboard. Let's find the product without using the squared material. Where do we begin our multiplication? (We begin in the ones place.) How much is 2 times 2? (2 times 2 is 4.) Where should we write the 4? Explain." (Since 2 times 2 ones equal 4 ones, the 4 should be written in the ones place in the product.) e.g., $\begin{array}{r}42\\ \underline{\times\ 2}\\ 4\end{array}$

Say,"What do you think we multiply next? (We multiply 2 times 40 or 2 times 4 tens which equals 80

STRATEGY 1: cont'd

or 8 tens.) What should we write in the product?" (We should write 80 in the product.)

e.g.,

$$\begin{array}{r} 42 \\ \underline{\times\ 2} \\ 4 \\ 80 \end{array}$$

Say, "How can we find the total product? (We can add 4 plus 80.) What is the total product?" (The total product is 84.) Ask a student to complete the example on the chalkboard.

e.g.,

$$\begin{array}{r} 42 \\ \underline{\times\ 2} \\ 4 \\ \underline{80} \\ 84 \end{array}$$

Say, "The 4 and the 80 are called partial products because each number is only part of the product. The total product is 84. When we multiply a 2-digit number by a 1-digit number it is not necessary to write partial products." Demonstrate the process of multiplying 2 x 42 without partial products. Elicit that the 8 in the product represents the 80 in the partial product.

e.g.,

$$\begin{array}{r} 42 \\ \underline{\times\ 2} \\ 4 \\ \underline{80} \\ 84 \end{array} \qquad \begin{array}{r} 42 \\ \underline{\times\ 2} \\ 84 \end{array}$$

On the chalkboard write several other 2-digit multiplication examples which do not require regrouping. Ask the students to use their squared material to determine the products and then to complete the examples showing answers with and without partial products.

Note: Partial products should be used only as a tool for understanding the process of multiplication.

STRATEGY 1: cont'd

When the students have demonstrated facility with multiplication of 2-digit numbers by 1-digit numbers, multiplication of 3-digit numbers by 1-digit numbers should be introduced.

STRAGEGY 2:

Write several 2-digit multiplication examples on the chalkboard. These examples should not require regrouping.

e.g.,

$$\begin{array}{r} 23 \\ \underline{\times\ 2} \end{array} \qquad \begin{array}{r} 34 \\ \underline{\times\ 2} \end{array}$$

Say, "Look at the first example. How do we read this example? (This example says 2 groups of 23.) If we wrote 23 on a place value chart, what would the value of each digit be?" (The value of the 3 would be 3 ones. The value of the 2 would be 2 tens or 20.) Rewrite this example in expanded notation and solve it.

e.g.,

$$\begin{array}{rcccc} 23 & = & 2 \text{ tens} + 3 \text{ ones} & = & 20 + 3 \\ \underline{\times\ 2} & & \underline{\times \qquad\qquad 2} & & \underline{\times \qquad 2} \\ 46 & = & 4 \text{ tens} + 6 \text{ ones} & = & 40 + 6 \end{array}$$

Say, "What can we say about these 3 expressions?" (Although the answers look different, they all have the same value.) Demonstrate how this example can be solved using the distributive property of multiplication over addition.

e.g.,

$$\begin{aligned} 2 \times 23 &= 2 \times (2 \text{ tens} + 3 \text{ ones}) \\ 2 \times 23 &= (2 \times 2 \text{ tens}) + (2 \times 3 \text{ ones}) \\ 2 \times 23 &= (2 \times 20) + (2 \times 3) \\ 2 \times 23 &= 40 + 6 \\ 2 \times 23 &= 46 \end{aligned}$$

Say, "How did we find the product? (We expanded the numerals and multiplied the ones and the tens. Could

STRATEGY 2: cont'd

we have solved the problem without using expanded notation." (Yes, we could have multiplied each digit in the example, starting with the ones and ending with the tens.)

Repeat this procedure using other examples in vertical and horizontal formats. Ask some students to work at the chalkboard while the other students write in their notebooks.

Note: See Strategy 1 to develop the standard multiplication algorithm which should be used for all computation.

3.04.10.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare and display a word problem.
e.g.,

> Sarah works at the Bronx Zoo. She works every day for 3 hours. During the month of March she worked 23 days. How many hours did Sarah work during the month of March?

Say, "What must we find? (We must find how many hours Sarah worked in 23 days.) Does the problem give us any information to help us solve it? (Sarah worked 3 hours a day for 23 days.) How could we add to solve this problem? (Since Sarah worked 3 hours each day, we could add 3, 23 times.) Is there a faster way to solve this problem? Explain." (When we must add the same number many times, it is faster to multiply.) Ask a student to write the appropriate multiplication example on the chalkboard, solve, and label it.
e.g.,

23 days Sarah worked
x 3 hours Sarah worked each day
69 hours Sarah worked in March

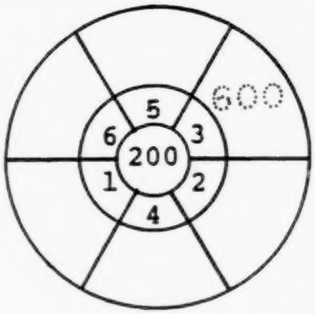
Repeat this procedure for other story problems.

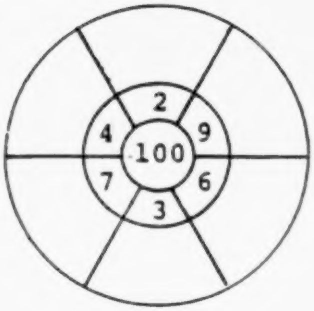
P.O.3.04.10.01 & .03

NAME: ____________________ **CLASS:** __________ **DATE:** ________

Complete each example and problem below.

① Multiply the number in the center of each wheel by the numbers around them.





②

$$\begin{array}{r} 20 \\ \times\ 3 \\ \hline \end{array} \qquad \begin{array}{r} 200 \\ \times\ 3 \\ \hline \end{array}$$

4 x 10 = ☐

1 x 40 = ☐

2 x 30 = ☐

4 x 100 = ☐

1 x 400 = ☐

2 x 300 = ☐

$$\begin{array}{r} 40 \\ \times\ 2 \\ \hline \end{array} \qquad \begin{array}{r} 400 \\ \times\ 2 \\ \hline \end{array}$$

③ Joan earns 300 dollars a week. If she works for 3 weeks, how much money will she earn?

She will earn ________ dollars.

④ Theater tickets for senior citizens cost 2 dollars each. If 400 senior citizens go to the movies, how much money will the theater take in?

The theater will take in _____ dollars.

⑤ Each carton of math books contains 100 books. If the school receives 9 cartons, how many books will it receive?

The school will receive __________ books.

⑥ Two jars of vitamins each contain 200 vitamins. If Sally takes 1 vitamin a day, for how many days will the two jars last?

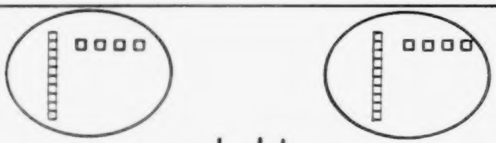
The two jars will last __________ days.

P.O. 3.04.10.02-.03

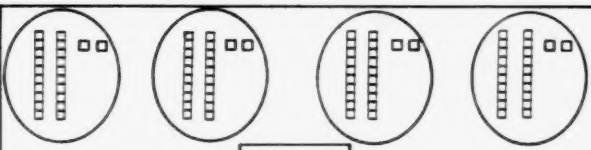
NAME:____________________ CLASS:________ DATE:________

Follow the directions below.

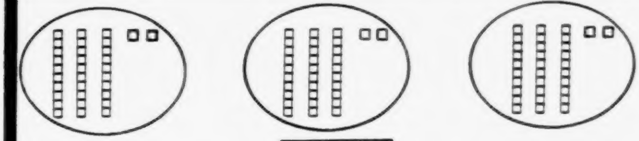
Write and solve the multiplication example represented by each group of squared material.



14
x . 2
28



☐
x ☐
☐



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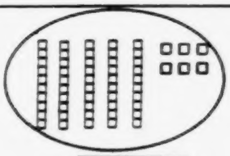


☐
x ☐
☐

Find the product for each example. Then write the example horizontally.

42
x 2
☐

____ x ____ = ____

33
x 3
☐

____ x ____ = ____

Complete this example in expanded notation.

243 = ☐ hundreds + ☐ tens + ☐ ones = ☐ + 40 + ☐
x 2   x 2   x 2
☐ hundreds + ☐ tens + 6 ones   ☐ + ☐ + 6

In Maria's school each staircase has 13 steps. Maria is on the first floor. She wants to go to her classroom on the fourth floor. How many steps must she walk?

Maria must walk ________ steps.

SHARPENING YOUR SKILLS

Units 56, 57, 58

Name: ____________________ **Class:** __________ **Date:** __________

Find the hidden products on the multiplication table. Then write the facts.

x	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	♡	18	20
3	0	3	6	9	▲	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	☺
5	0	5	10	15	20	25	30	⚾	40	45	50
6	0	6	🧤	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	☆	56	64	🍎	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

1. ▲ is covering 12 3X4 =12
2. ♡ is covering ☐. ________
3. ☺ is covering ☐. ________
4. 🧤 is covering ☐. ________
5. ☆ is covering ☐. ________
6. 🍎 is covering ☐. ________
7. ⚾ is covering ☐. ________

8. Write all the possible arrangements for the set of numbers, {9, 2, 4}

________ ________

________ ________

________ ________

Look for the patterns on the multiplication table.

x	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

9. The horizontal loop shows __________.

   ⓐ counting by fives.

   ⓑ a row of odd numbers.

   ⓒ addition is commutative.

10. The vertical loop shows __________.

   ⓓ a row of odd numbers.

   ⓔ the multiples of six.

   ⓕ the sums of the vertical and horizontal addends.

11. The product of 3 x 300 is __________.

   ⓐ 90 ⓒ 900

   ⓑ 600 ⓓ 6000

Unit 59

3.05.06 DIVISION OF 2- AND 3-DIGIT DIVIDENDS BY 1-DIGIT DIVISORS WITHOUT REGROUPING (EXCHANGE)

(2-3 lessons)

PERFORMANCE OBJECTIVES

3.05.06.01B divide a 2-digit dividend by a 1-digit divisor without regrouping (exchange) or a remainder;

e.g.,

$$\begin{array}{r} 21 \\ 4\overline{)84} \end{array}$$

check

$$\begin{array}{r} 21 \\ \underline{\times\ 4} \\ 84 \end{array}$$

3.05.06.02B divide a 3-digit dividend by a 1-digit divisor without regrouping (exchange) or a remainder;

e.g.,

$$\begin{array}{r} 132 \\ 3\overline{)396} \end{array}$$

check

$$\begin{array}{r} 132 \\ \underline{\times\ \ 3} \\ 396 \end{array}$$

3.05.06.03B solve word problems related to skills learned in this module.

e.g.,

> Alex has a box of 246 crayons. He will divide the crayons equally between 2 of his classmates. How many crayons will each student get?

VOCABULARY

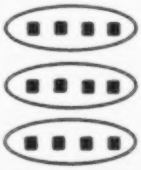
TERMS

dividend
divisor
quotient

GETTING STARTED 1:

Prepare and distribute 30 unit squares and several strings to each student or group of students. Use the unit squares to show 3 x 4 = 12. Ring each group of 4 squares with the string.

e.g.,



Say, "How many groups of squares do we have? (We have 3 groups of squares.) How many squares are in each group? (There are 4 squares in each group.) If we remove the strings and have only 1 group, how many squares will we have?" (We will have 12 squares.) Ask a student to write the multiplication fact on the chalkboard which represents 3 groups with 4 squares in each group.

e.g.,

$$3 \times 4 = 12 \qquad \begin{array}{r} 4 \\ \underline{\times 3} \\ 12 \end{array}$$

Say, "We can say that 3 groups with 4 squares in each group equals 12 squares in all. Place 12 squares on your desk. Separate them into groups of 4. Ring each group of 4 squares with the string. How many groups of 4 did you make?" (I made 3 groups of 4.) Ask a student to write a division fact on the chalkboard which represents 12 squares separated into 3 equal groups.

e.g.,

$$12 \div 4 = 3 \qquad \begin{array}{r} 3 \\ 4\overline{)12} \end{array}$$

Say, "How do we read these examples? (We say, twelve divided by four equals three.) How can we check this division example?" (We can check a division example by using its related multiplication fact.)

GETTING STARTED 1: cont'd

e.g.,

$$12 \div 4 = 3 \qquad \begin{array}{r} 3 \\ 4\overline{)12} \end{array} \qquad \begin{array}{c} \text{check} \\ \hline 3 \times 4 = 12 \end{array} \qquad \begin{array}{r} 4 \\ \underline{\times 3} \\ 12 \end{array}$$

Repeat this procedure with other division facts.

GETTING STARTED 2:

Prepare and display several cards, each with a division or multiplication word problem, and flashcards, each with a number sentence to match a word problem.

e.g.,

> Paul collected 28 shells.
> He made shell necklaces
> and used 7 shells for each
> necklace. How many necklaces
> did Paul make?

$28 \div 7 = \square$

The word problems and cards should be mixed so the students do not immediately see which number sentences and word problems match. To determine whether the students can differentiate between multiplication and division word problems say, "Read each word problem. Find the number sentence which matches the word problem. Place the card with the matching number sentence next to the word problem. Explain why you matched these cards."

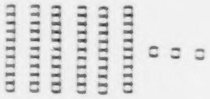
3.05.06

3.05.06.01 **divide a 2-digit dividend by a 1-digit divisor without regrouping (exchange) or a remainder**

STRATEGY 1: Prepare and distribute squared material (tens and ones) to each student or group of students. On the chalkboard write a division example and display squared material which represents the dividend.

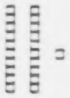
e.g.,

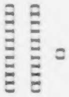
$3\overline{)63}$

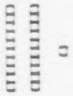


Ask the students to place 6 tens and 3 ones on their desks. Say, "What do 6 tens and 3 ones equal? (6 tens and 3 ones equal 63.) If you want to share this squared material equally among 3 people how would you do it?" (I would divide the tens into 3 groups and the ones into 3 groups. I would place ones and tens together so there are an equal number of ones and tens in each group.) Ask the students to demonstrate and say, "How much is in each group?" (There are 21 in each group.)

e.g.,







Say, "We started with 63. We divided 63 into 3 equal groups. We have 21 in each group. Let's see how we can divide 63 into 3 equal groups without using squared material." Write "tens" and "ones" above the division example in the appropriate places.

e.g.,

$$\begin{array}{r|ll} & \text{tens} & \text{ones} \\ \hline 3) & 6 & 3 \end{array}$$

Say, "Which number represents the dividend? (63 represents the dividend.) When we add, subtract, and multiply, we begin in the ones place. When we divide, we begin in the place furthest to the left in the dividend. What number is furthest to the left in

STRATEGY 1:
cont'd

the dividend? (6 is furthest to the left.) In what place is the 6? (The 6 is in the tens place.) Therefore, the first digit we will write in the quotient will be written in the tens place. Let's place a line in the tens place in the quotient to show where we will place the first digit."

e.g.,

tens	ones
—	
3)6	3

Say, "We will begin our division with the digit furthest to the left in the divisor. What does the 6 represent? (The 6 represents 6 tens or 60.) If we divide 6 by 3 or divide 3 into 6, how many threes are in 6? (There are 2 threes in 6.) Where should we place the 2? (We should place the 2 above the 6 in the tens place.) Why?" (When we divide 6 tens by 3, the result is 2 tens.)

e.g.,

tens	ones
2	
3)6	3

Say, "What does the 2 represent? (The 2 represents 20.) This means there are at least 20 threes in 63. If we multiply 3 x 20 we get 60. We can subtract the 60 from 63 to find out what is left to divide."

e.g.,

tens	ones
2	
3)6	3
-6	0
	3

3 x 20 = 60

Say, "Since there was a difference of 3 after we subtracted, we know there are more threes in 63. Where will we write the next digit in the quotient? (The next digit will be written in the ones place.)

STRATEGY 1: cont'd

Let's draw a line in the ones place in the quotient and then divide 3 by 3. How much is 3 divided by 3? (3 divided by 3 equals 1.) Let's write 1 in the quotient and then multiply 3 times 1. How much is 3 x 1? (3 x 1 equals 3.) Let's subtract 3 from the remaining dividend."

e.g.,

tens	ones
2	1
3)6	3
-6	0
	3
	-3
	0

3 x 20 = 60

3 x 1 = 3

Say, "What is the quotient?" (The quotient is 21.)

Repeat this procedure, outlining the steps for division. The students should eventually see the pattern for dividing; divide, multiply, subtract.

Note: This method should be used to introduce division but the goal for the student should be "short division".

e.g.,

$$\begin{array}{r} 21 \\ 3\overline{)63} \end{array}$$

The student should maintain an awareness of the place value involved in division.

STRATEGY 2: Write a division example on the chalkboard.

e.g.,

$$2\overline{)68}$$

Say, "Division is different from addition, subtraction, and multiplication, in a very important way. When we add two numbers, in which column do we begin adding? (We begin adding in the ones column.) In which column do we begin when we subtract? (We begin in the ones column.) ... when we multiply? (...ones column.) When we add, subtract, or multiply, we begin with the least value, the ones place. However,

STRATEGY 2: cont'd

when we divide, we begin in the place with the greatest value. In the example on the chalkboard, in what column in the dividend, is the digit with the greatest value? (It is in the tens column.) That is where we will begin to divide. Write the example in your notebooks."

Ask a student to work at the chalkboard while the other students write in their notebooks. Point to the tens column of the dividend. Say, "What digit is in the tens place? (The digit in the tens place is 6.) How much is 6 divided by 2? (6 divided by 2 is 3.) (There are 2 threes in 6.) Write the number 2 directly above the 6 in the example. What does this 2 represent?" (It represents 2 tens or 20.) Point to the digit in the ones place in the dividend. Say, "What digit is in the ones place? (8 is in the ones place.) How much is 8 divided by 2? (8 divided by 2 is 4.) Write the number 4 directly above the 8."

e.g.,

$$\begin{array}{r} 34 \\ 2\overline{)68} \end{array}$$

Say, "How much is 68 divided by 2? (68 divided by 2 is 34.) How can we check our work?" (We can check our work by multiplying the quotient by the divisor. The answer should be the same as the dividend.)

e.g.,

$$\begin{array}{r} 34 \\ 2\overline{)68} \end{array} \qquad\qquad \begin{array}{r} \underline{\text{check}} \\ 34 \\ \times\ 2 \\ \hline 68 \end{array}$$

3.05.06.02 **divide a 3-digit dividend by a 1-digit divisor without regrouping (exchange) or a remainder**

STRATEGY 1: Adapt Strategy 1 or 2, P.O. 3.05.06.01.

3.05.06

3.05.06.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare and distribute sets of chips to each group of students.

Write a word problem on the chalkboard.
e.g.,

> Roger found 48 Statue of Liberty medals. He wanted to share them equally among 4 of his friends. How many medals did each of his friends get?

Say, "What are we being asked to find? (We are being asked to find how many medals each friend received.) Let's solve this problem by pretending to be Roger and his friends. This is called role playing. We will use these chips instead of medals." Ask a student to be Roger. Give him 48 chips. Ask four other students to act as Roger's friends. Say, "What should Roger do to share the medals equally?" (He should give one medal to each student, then another and another, until all the medals are given out.) Give 'Roger' time to distribute the medals and say, "How many medals did each friend receive? (Each friend received 12 medals.) Is there another way to solve the problem?" (We could write a division example and solve it.) Ask a student to write and solve the appropriate example on the chalkboard while the other students solve the example in their notebooks.

e.g.,

$$\begin{array}{r} 12 \\ 4\overline{)48} \end{array}$$

STRATEGY 2: Write a word problem on the chalkboard.
e.g.,

> Pat's red fabric is 66 inches long. She will cut 3 inch strips from the fabric to decorate gifts for children in the hospital.

STRATEGY 2:
cont'd

> There are 100 children in the hospital.
> How many 3 inch strips of fabric can she cut from the fabric?

Say, "Before we solve this problem we must decide what is being asked and what information we have to help us solve it. What do we have to find? (We have to find how many 3 inch strips of fabric we can cut.) What information do we have? (We know the fabric is 66 inches long. We know there are 100 children.) Is there any information we do not need to solve this problem?" (There are 100 children in the hospital.) Ask a student to cross out that information. Say, "How can we solve the problem? (We can take paper that is 66 inches long and start cutting 3-inch pieces.) Yes, this is called modeling. We can make a model of the fabric that Pat used. Can someone think of another way?" (We can keep subtracting 3 from 66 and see how many times we subtract 3.) Ask a student to come to the chalkboard and begin subtracting 3 from 66.

e.g.,

$$66 - 3 = 63 - 3 = 60 - 3 = 57 \ldots$$

Say, "How many times were we able to subtract 3? (We subtracted three 22 times.) This took a lot of time. How else could we have solved this problem?" (We could have divided.) Ask a student to do the division on the chalkboard while the other students write in their notebooks.

e.g.,

$$3\overline{)66}^{\,22}$$

Say, "How many 3-inch strips can Pat make?" (Pat can make 22 three-inch strips.)

P.O. 3.05.06.01 & .03

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

Find the quotients and check.

① **solve** **check** $\begin{array}{r}31\\3\overline{)93}\end{array}$ $\begin{array}{r}31\\ \times\ 3\\ \hline 93\end{array}$	② $4\overline{)84}$	③ $2\overline{)26}$
④ $2\overline{)40}$	⑤ $2\overline{)46}$	⑥ $3\overline{)63}$
⑦ $8\overline{)80}$	⑧ $2\overline{)24}$	⑨ $3\overline{)33}$
⑩ $3\overline{)39}$	⑪ $7\overline{)77}$	⑫ $2\overline{)48}$

Solve the problems.

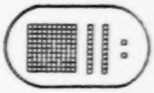
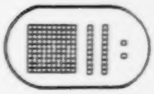
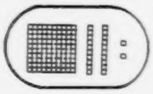
44 pennies 2 students How many pennies for each student? ________ pennies **solve**	55 pennies How many nickels? ________ nickels **solve**

P.O. 3.05.06.02-.03

NAME:______________________________ CLASS:__________ DATE:________

Follow the directions below.

Look at each group of squared material. Write, solve, and check division examples based upon the groupings of the squared material.

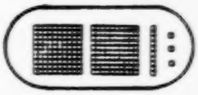
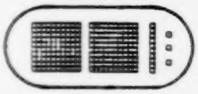
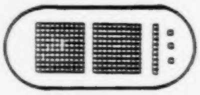




solve

$\begin{array}{r} 122 \\ 3\overline{)366} \end{array}$

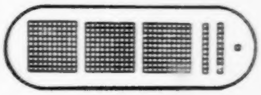
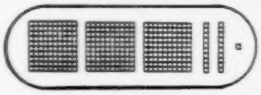
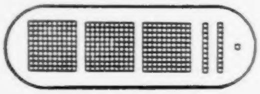
check

$\begin{array}{r} 122 \\ \times\ \ 3 \\ \hline 366 \end{array}$

solve

check

solve

check

Solve and check.

$\begin{array}{r} 121 \\ 2\overline{)242} \end{array}$ $\begin{array}{r} 121 \\ \times\ \ 2 \\ \hline 242 \end{array}$	$3\overline{)630}$	$5\overline{)555}$
$6\overline{)666}$	$4\overline{)844}$	$2\overline{)862}$

Solve the problem.

solve

226 cars were shipped from Japan to the United States. If 2 ships carried an equal number of cars, how many cars were on each ship?

P.O. 3.05.06.03

NAME: ________________ CLASS: __________ DATE: ________

Read each problem. Cross out the sentence which has information which is not needed to solve the problem. Then solve the problem.

1. In the year 1214 Queen Laurette made a party to celebrate King Howard's birthday. She invited 480 people. She used 4 dining rooms. If an equal number of people ate dinner in each room, how many people were in each room?

solve

2. 3 people, who wore black and white costumes, shared 63 black and white balloons equally. When the party was over, they gave 25 white balloons to the children. How many balloons did each person, in a black and white costume, receive?

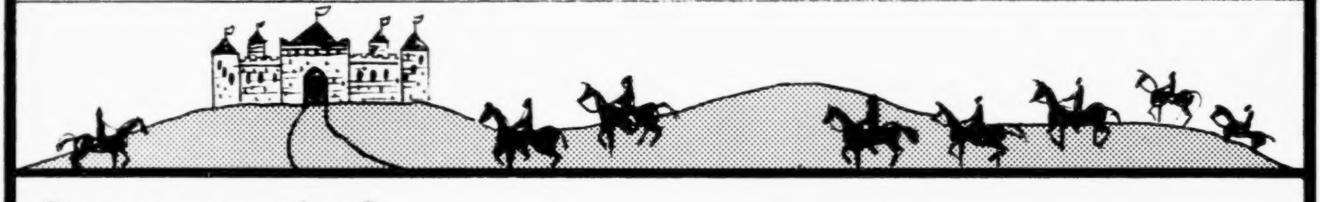
solve

3. At exactly 12 o'clock the guests gathered in the great hall to dance. 246 guests were divided into groups of 2. How many groups of 2 were there?

solve

4. As the clock struck 2:00 A.M., 212 guests went home. 268 guests stayed for breakfast. These guests shared 2 dining rooms equally. How many guests ate breakfast in each dining room?

solve



Do you remember?

Circle the numbers which belong in the solution set for each inequality. Then write the solution set.

$\square \times 4 < 24$

1, 2, 3, 4, 5, 6, 7, 8, 9

solution set = { }

3.02.06 ADDITION OF 4-DIGIT NUMBERS

(3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.02.06.01B add two 4-digit numbers without regrouping (exchange) and check; e.g.,

$$\begin{array}{r} 1,234 \\ +4,123 \\ \hline 5,357 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 4,123 \\ +1,234 \\ \hline 5,357 \end{array}$$

3.02.06.02B add two 4-digit numbers with one regrouping (exchange) and check; e.g.,

$$\begin{array}{r} 1,\overset{\prime}{2}62 \\ +4,541 \\ \hline 5,803 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 4,\overset{\prime}{5}41 \\ +1,262 \\ \hline 5,803 \end{array}$$

3.02.06.03B add two 4-digit numbers with two regroupings (exchanges) and check; e.g.,

$$\begin{array}{r} 3,\overset{\prime}{5}\overset{\prime}{3}4 \\ +1,267 \\ \hline 4,801 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 1,\overset{\prime}{2}\overset{\prime}{6}7 \\ +3,534 \\ \hline 4,801 \end{array}$$

3.02.06.04B add two 4-digit numbers with three regroupings (exchanges) and check; e.g.,

$$\begin{array}{r} \overset{\prime}{3},\overset{\prime}{7}\overset{\prime}{3}4 \\ +1,267 \\ \hline 5,001 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ \overset{\prime}{1},\overset{\prime}{2}\overset{\prime}{6}7 \\ +3,734 \\ \hline 5,001 \end{array}$$

3.02.06.05B rewrite a 4-digit horizontal addition example in vertical format with regrouping (exchange), add and check;

e.g.,

$$6{,}432 + 41 + 837 + 95 = \ 7{,}406$$

$$\begin{array}{r} {}^{1\;2\;1}\\ 6{,}432\\ 41\\ 837\\ +\quad 95\\ \hline 7{,}405 \end{array} \qquad\qquad \begin{array}{r} \underline{\text{check}}\\ {}^{1\;2\;1}\\ 95\\ 837\\ 41\\ +6{,}432\\ \hline 7{,}405 \end{array}$$

3.02.06.06B solve word problems related to skills learned in this module.

e.g.,

A plane flew 3,275 miles one day, and 1,547 miles the next day. How many miles were flown in all?

VOCABULARY

TERMS

regrouping
exchange
decimal point
dollar sign

GETTING STARTED 1:

Display an addition word problem involving two 3-digit numbers with regrouping in 2 places.

e.g.,

> Apples are ready to be picked in the fall in upstate New York. Two families went apple picking. The Riveras picked 286 apples. The Chins picked 129 apples. How many apples did they pick in all?

Say, "What must we find to solve this problem? (We must find the number of apples both families picked.) What information will help us solve the problem? (We know that the Riveras picked 286 apples and the Chins picked 129 apples.) What must we do to solve this problem? (We must add.) How can you estimate about how many apples were picked?" (We can round 286 to 300 and 129 to 100. If we add 300 plus 100, the estimate is 400.) Ask a student to write 286 + 129 on the chalkboard in vertical format, find the sum, and label the addends and the sum as the other students write it in their notebooks.

e.g.,

```
  11
  286 apples Riveras picked
 +129 apples Chins picked
  415 apples picked in all
```

Review the process of regrouping ones for tens and tens for hundreds by asking appropriate questions and eliciting appropriate responses from the students. (See Unit 34, Module 3.02.05, p.41.) Compare the estimated sum with the actual sum.

Repeat this procedure using other problems.

GETTING STARTED 2:

Prepare and distribute squared material (hundreds, tens, ones) to each

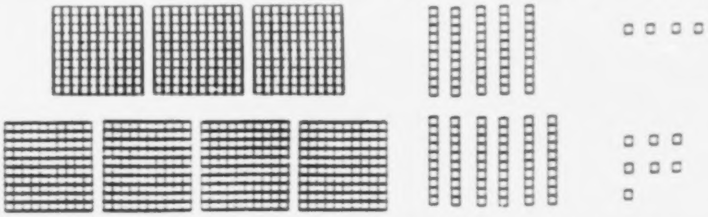
GETTING STARTED 2: cont'd

group of students. Ask a student to write the addition example, 354
+467

on the chalkboard. Say, "Use your squared material to represent this example."

e.g.,

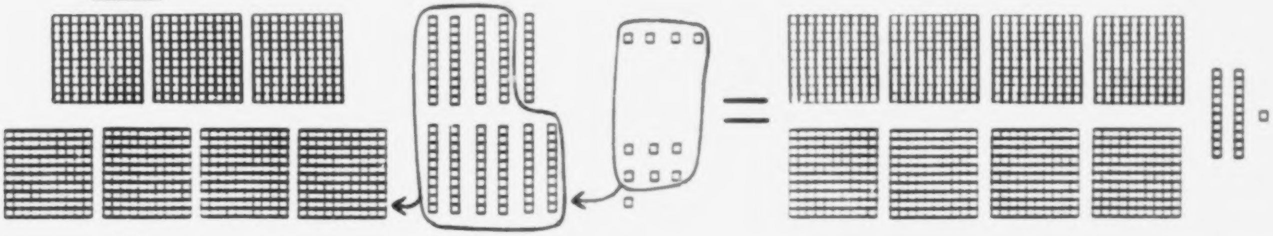
354
+467



Say, "How many ones are there in all? There are 11 ones in all.) How many tens are there in all? (There are 11 tens in all.) How many hundreds are there in all? (There are 7 hundreds in all.) In which columns must we regroup? (We must regroup in the ones and the tens columns.) Explain. (We cannot write more than 1 digit in each column. Since there are 11 ones and 11 tens, we must regroup.) How can we regroup the ones? (We can exchange 10 ones for 1 ten. This will leave 1 one.) Let's take a ten that is not on display, exchange it for the 10 ones, and place it with the other tens. How many tens do we have now? (We have 12 tens now.) How can we regroup the tens? (We can exchange 10 tens for 1 hundred. This will leave 2 tens.) How many hundreds do we have now?" (We have 8 hundreds now.) Ask a student to demonstrate the exchange.

e.g.,

354
+467



Say, "What is the sum?" (The sum is 821.) Ask a student to demonstrate the exchange in the example at the chalkboard as the other students write it in their notebooks.

e.g.,

354
+467
821

3.02.06

3.02.06.01 **add two 4-digit numbers without regrouping (exchange) and check**

STRATEGY 1: Adapt Strategy 1 or 2, P.O. 3.02.02.01 (p.25S.1).

3.02.06.02 **add two 4-digit numbers with one regrouping (exchange) and check**

STRAGEGY 1: Adapt Strategy 1 or 2, P.O. 3.02.03.01 (p.27S.1).

3.02.06.03 **add two 4-digit numbers with two regroupings (exchanges) and check**

STRAGEGY 1: Adapt Getting Started: 2, Unit 60, Module 3.02.06 (p.69GS.2)

3.02.06.04 **add two 4-digit numbers with three regroupings (exchanges) and check**

STRATEGY 1: Write the following example on the chalkboard:

$$\begin{array}{r} 3{,}785 \\ \underline{+2{,}367} \end{array}$$

Say, "We will write this example on the chalkboard in expanded notation as you write it in your notebooks. Let's begin with the addend on top. What does the 3 represent? (The 3 represents 3000.)... 7 represent? (...700.)... 8 represent? (...80.) ...5 represent?" (...5.) Ask a student to write 3,785 in words and numbers in expanded notation on the chalkboard as the other students write it in their notebooks. Repeat this procedure for the addend, 2,367.

e.g.,

$$\begin{array}{rl} 3{,}785 & = 3 \text{ thousands} + 7 \text{ hundreds} + 8 \text{ tens} + 5 \text{ ones} \\ \underline{+2{,}367} & = \underline{2 \text{ thousands} + 3 \text{ hundreds} + 6 \text{ tens} + 7 \text{ ones}} \end{array}$$

Say, "Where do we begin to add when adding a 1-, 2-, or, 3-digit number? (We begin in the ones place.) Is

STRATEGY 1:
cont'd

this also true for a 4-digit number? Explain. (When adding a 4-digit number we begin in the ones place. The number of digits does not change the place in which we begin our addition.) Let's add the expanded notation."

e.g.,

$$\begin{array}{rl}
3{,}785 = & 3 \text{ thousands} + \ \ 7 \text{ hundreds} + \ \ 8 \text{ tens} + \ \ 5 \text{ ones}\\
\underline{+2{,}367} = & \underline{2 \text{ thousands} + \ \ 3 \text{ hundreds} + \ \ 6 \text{ tens} + \ \ 7 \text{ ones}}\\
 & 5 \text{ thousands} + 10 \text{ hundreds} + 14 \text{ tens} + 12 \text{ ones}
\end{array}$$

Say, "How many digits may we have in each place in the sum? (We may have 1 digit in each place in the sum.) Look at the ones place. How can we rename 12 ones so there is only 1 digit in the ones place? (12 ones can be renamed as 1 ten and 2 ones.) Where can we place the 2 ones and the 1 ten? (The 1 ten should be written as an addend in the tens place and added to the other tens. The 2 ones should be written as the sum in the ones place.) What is the new sum in the tens place? (The new sum is 15 tens.) How can we rename 15 tens so there is only 1 digit in the tens place? (15 tens can be renamed as 5 tens and 1 hundred.) Where can we place the 5 tens and the 1 hundred?" (The 1 hundred should be written as an addend in the hundreds place and added with the other hundreds. The 5 tens should be written in the sum in the tens place.) Repeat this procedure for renaming 10 hundreds as 1 thousand. As each step is completed, write the appropriate digit in the sum and the addends.

e.g.,

$$\begin{array}{rl}
\overset{1}{3},\overset{1}{7}\overset{1}{8}5 = & \overset{1 \text{ thousand}}{3 \text{ thousands}} + \overset{1 \text{ hundred}}{7 \text{ hundreds}} + \overset{1 \text{ ten}}{8 \text{ tens}} + \ \ 5 \text{ ones}\\
\underline{+2{,}367} = & \underline{2 \text{ thousands} + \ \ 3 \text{ hundreds} + \ \ 6 \text{ tens} + \ \ 7 \text{ ones}}\\
6{,}152 = & 6 \text{ thousands} + \ \ 1 \text{ hundreds} + \ \ 5 \text{ tens} + \ \ 2 \text{ ones}
\end{array}$$

Say, "How can we check to see if our addition is correct?" (We can rewrite the example by switching

STRATEGY 1: cont'd

addends and then adding.

e.g.,

$$\begin{array}{r} 1\ 11\ \\ 3{,}785 \\ +2{,}367 \\ \hline 6{,}152 \end{array} \qquad\qquad \begin{array}{r} \underline{\text{check}} \\ 1\ 11\ \\ 2{,}367 \\ +3{,}785 \\ \hline 6{,}152 \end{array}$$

Ask the students to write the addition example and the check in their notebooks. Repeat this procedure with other 4-digit numbers.

Note: It is appropriate to estimate sums before adding. However, the students have not yet been taught to round numbers to the nearest thousand. More capable students, who can easily see the extension from rounding to the nearest hundred, should be encouraged to estimate 4-digit sums.

3.02.06.05 **rewrite a 4-digit horizontal addition example in vertical format with regrouping (exchange), add and check**

STRATEGY 1: Write the following example on the chalkboard:

$2{,}541 + 28 + 4{,}103 + 362 = \square$

Say, "In what format is this example written? (This example is written in horizontal format. The numbers are written across the page instead of from top to bottom.) What should we do if we want to add these numbers easily?" (We should rewrite the numbers vertically, or up and down on the page.) Write 2,541 on the chalkboard. Review the names of each place. Say, "Where will we place the number 28 if we want to write 28 below 2,541? Explain." (Since the 8 in 28 represents 8 ones it will be written in the ones place beneath the 1 in 2,541. Since the 2 in 28 represents 2 tens it will be written in the tens place beneath the 4 in 2,541.) Ask a student to write 28 in the appropriate place on the chalkboard.

3.02.06

STRATEGY 1: cont'd

Repeat this procedure for 4,103 and 362.

e.g.,

$$\begin{array}{r} 2{,}541 \\ 28 \\ 4{,}103 \\ \underline{+\ \ 362} \end{array}$$

Ask a student to compute the sum on the chalkboard as the other students rewrite the horizontal format in vertical format in their notebooks and find the sum. Ask the students to check their addition.

e.g.,

$$\begin{array}{r} \\ \text{/ //} \\ 2{,}541 \\ 28 \\ 4{,}103 \\ \underline{+\ \ 362} \\ 7{,}034 \end{array} \qquad\qquad \begin{array}{r} \underline{\text{check}} \\ \text{/ //} \\ 362 \\ 4{,}103 \\ 28 \\ \underline{+2{,}541} \\ 7{,}034 \end{array}$$

Say, "What must we do when we rewrite in vertical format, an example that has been written in horizontal format? (We must make sure the digits are written in the correct places.) Why?" (If they are not written in the correct places, the sum will be wrong when we add.)

3.02.06.06 **solve word problems related to skills learned in this module**

STRATEGY 1: On index cards write word problems which contain 2 or more addends with 4-, 3-, 2-, or 1-digit addends. Include some subtraction problems so the students may differentiate between the operations necessary to solve the problems.

e.g.,

> The Stein family flew to France, a distance of 3,453 miles. They rented a car. One week they drove 302 miles. Another week they drove 635 miles. The flight home was 3,453 miles. What was the total air and land mileage they traveled?

STRATEGY 1: cont'd

Say, "Each group of students will be given an index card with a word problem written on it. You will read the problem and determine how to solve it. Each student in the group will solve the problem in his/her notebook." When most of the students have completed their work say, "One student in each group will read the problem aloud. A second student will be the "teacher" and ask the other groups how they would solve the problem. A third student, the explainer will explain how his/her group solved the problem. A fourth student, the solver, will write the problem and the solution on the chalkboard." On the chalkboard write the following:

	Reader	"Teacher"	Explainer	Solver
group A				
group B				
group C				
group D				

Say, "Take a minute to decide which role each person in your group will play. When I call your group, each person will write his/her name in the appropriate column on the chalkboard."

e.g.,

	Reader	"Teacher"	Explainer	Solver
group A	Meg	Sandy	Paul	Lee
group B				
group C				
group D				

Ask the students to explain the ways in which they solved the problems. Allow for discussion. Elicit from the students the most direct methods used and how estimating the answers can assist in determining whether the answers are correct.

P.O. 3.02.06.01,.02 & .06

NAME: ______________________ CLASS: ________ DATE: ________

Complete the examples and solve the problems below.

Add. Check your work on a separate sheet of paper.

① $\begin{array}{r}2,035\\+1,264\\\hline\end{array}$	② $\begin{array}{r}5,167\\+3,332\\\hline\end{array}$	③ $\begin{array}{r}4,680\\+4,226\\\hline\end{array}$	④ $\begin{array}{r}5,053\\+4,636\\\hline\end{array}$
⑤ $\begin{array}{r}3,456\\+1,623\\\hline\end{array}$	⑥ $\begin{array}{r}2,824\\+5,090\\\hline\end{array}$	⑦ $\begin{array}{r}1,187\\+6,219\\\hline\end{array}$	⑧ $\begin{array}{r}4,635\\+4,852\\\hline\end{array}$

⑨ In the forest behind Bill's house, the third grade students collected 1,062 pine cones 1 week and 1,425 pine cones the second week. How many pine cones did they collect in all?	solve
⑩ Squirrels collect acorns and store them for food in the winter. One squirrel family collected 3,226 acorns. Another squirrel family collected 4,913 acorns. What was the total number of acorns they collected?	solve
⑪ This forest is very large. It has 3,526 pine trees and 2,292 oak trees. How many oak trees and pine trees are there in the forest?	solve
⑫ During 2 years many pine trees were cut down to be used as Christmas trees. 1,280 trees were cut down the first year. 1,495 trees were cut cut down the second year. How many trees were cut down during both years?	solve

P.O. 3.02.06.02-.04 & .06

NAME: ______________________ CLASS: __________ DATE: ________

Use the chart to answer the questions below.

Sam's Trip Around the World		
From	To	Distance in Miles
New York	London	3,459
London	Istanbul	1,551
Istanbul	Moscow	1,088
Moscow	Bombay	3,131
Bombay	Singapore	2,429
Singapore	Tokyo	3,304
Tokyo	San Francisco	5,031
San Francisco	New York	2,571

1. How many miles did Sam travel to go from New York to Istanbul?

solve **check**

2. How many miles did Sam fly from London to Bombay?

solve **check**

3. How far did Sam fly in traveling from Tokyo to New York?

solve **check**

4. The distance from Moscow to Tokyo is 8,864 miles. If Sam travels from Istanbul to Tokyo, how far will he travel?

solve **check**

CHALLENGE!

What is the total distance of Sam's trip around the world?

____

P.O. 3.02.06.05-.06

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

Rewrite each example in vertical format, solve, and check.

29 + 236 + 1,445 + 89 = ☐	4,426 + 319 + 203 +60 = ☐
5,828 + 3,113 + 47 + 614 = ☐	217 + 163 + 880 + 1,234 = ☐
209 + 6 + 813 + 4,025 = ☐	16 + 88 + 1,437 + 2,194 = ☐

Solve the problem.

solve

On the 2nd floor in 1 building in New York City there are 4 apartments. Mr. Williams has 2,006 books in his apartment. Mrs. Brown has 275 books in her apartment. The Smith family has 1,432 books. Jan and Mike Carlton have 85 books. How many books are there on the 2nd floor of this New York City building?

____

SHARPENING YOUR SKILLS

Units 59,60

Name: ____________________ **Class:** ____________ **Date:** ____________

Fill in the circle next to each correct answer for questions 1-4.

1.
$$\begin{array}{r} 2,643 \\ +3,780 \\ \hline \end{array}$$

ⓐ 1,143 ⓒ 6,423

ⓑ 6,433 ⓓ 5,423

2. $62 + 108 + 4,632 + 40 = \boxed{}$

ⓔ 4,732 ⓖ 4,742

ⓕ 471,312 ⓗ 4,842

3. $3\overline{)669}$

ⓐ 323 ⓒ 223

ⓑ 233 ⓓ 322

4. $2\overline{)86}$

ⓔ 43 ⓖ 403

ⓕ 34 ⓗ Not Here

5. There was a 4-day show at the Museum of Modern Art. The attendance on Sunday was 1,362 people, on Monday, 2,160 people, on Tuesday, 945 people, and on Thursday, 1,607 people. The museum is closed on Wednesday. How many people saw the show during the 4 days?

solve

6. 3 schools sent a total of 696 students to see the show. If each school sent an equal number of students, how many students were there from each school?

solve

Cross out the information that is not needed to solve the problem.

7. During the 4 days 484 people were at lunch in the museum cafeteria between 12 and 1 o'clock. If 4 people were seated at each table, how many tables were used?

Unit 61

3.03.06 SUBTRACTION OF 4-DIGIT NUMBERS

(3-4 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.03.06.01B subtract two 4-digit numbers without regrouping (exchange) and check;

e.g.,

$$\begin{array}{r} 7,849 \\ -5,432 \\ \hline 2,417 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 2,417 \\ +5,432 \\ \hline 7,849 \end{array}$$

3.03.06.02B subtract two 4-digit numbers with one regrouping (exchange) and check;

e.g.,

$$\begin{array}{r} 9,8\overset{6}{\cancel{7}}\overset{16}{\cancel{6}} \\ -5,437 \\ \hline 4,439 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 4,4\overset{1}{3}9 \\ +5,437 \\ \hline 9,876 \end{array}$$

3.03.06.03B subtract two 4-digit numbers with two regroupings (exchanges) and check;

e.g.,

$$\begin{array}{r} 9,\overset{7}{\cancel{8}}\overset{16}{\cancel{7}}\overset{16}{\cancel{6}} \\ -5,498 \\ \hline 4,378 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 4,\overset{1}{3}\overset{1}{7}8 \\ +5,498 \\ \hline 9,876 \end{array}$$

3.03.06.04B subtract two 4-digit numbers with three regroupings (exchanges) and check;

e.g.,

$$\begin{array}{r} \overset{8}{\cancel{9}},\overset{12}{\cancel{3}}\overset{15}{\cancel{6}}\overset{12}{\cancel{2}} \\ -5,798 \\ \hline 3,564 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ \overset{1}{3},\overset{1}{5}\overset{1}{6}4 \\ +5,798 \\ \hline 9,362 \end{array}$$

034

3.03.06.05B

compute subtraction examples having minuends with multiples of 100 or 1000 and check;

e.g.,

$$\begin{array}{r}
9\;9\;\; \\
3\;\cancel{10}\,\cancel{10}\,10 \\
4,\cancel{0}\cancel{0}\cancel{0} \\
\underline{-2,346} \\
1,654
\end{array}
\qquad\qquad
\begin{array}{r}
\underline{\text{check}} \\
1,654 \\
\underline{+2,346} \\
4,000
\end{array}$$

3.03.06.06B

solve word problems related to skills learned in this module.

e.g.,

> A plane has already flown 5,685 miles. Its destination is 8,321 miles away. How many more miles will it fly to reach its destination?

3.03.06

VOCABULARY

TERMS

subtrahend
minuend
difference
exchange
regroup

GETTING STARTED 1:

Prepare and display a place value chart and squared material (hundreds, tens, and ones). A thousand may be represented by a stack of 10 hundreds secured with a rubberband.

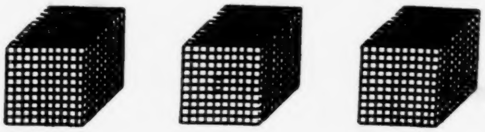
Say, "Today we will write 4-digit numbers." Ask a student to write 3,000 on the place value chart.

e.g.,

Thousands	Hundreds	Tens	Ones
3	0	0	0

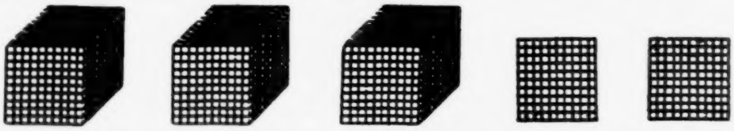
Say, "How many places does 3,000 have? (3,000 has 4 places.) What is the value of the 3?" (The 3 represents 3,000.) Ask a student to write 3,000 on the chalkboard without using the place value chart. Ask a student to read 3,000 aloud and represent 3,000 using squared material.

e.g.,

3,000 = 

On the chart, write 3,200. Say, "What is the value of the 2?" (The 2 represents 200.) Ask a student to write 3,200 on the chalkboard without using the place value chart. Ask a student to read 3,200 aloud and represent 3,200 using squared material.

e.g.,

3,200 = 

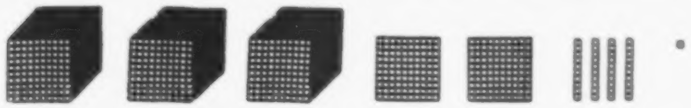
Repeat this procedure until the number 3,241 is written on the place value chart and on the chalkboard, and represented with squared material.

GETTING STARTED 1: cont'd

e.g.,

Thousands	Hundreds	Tens	Ones
3	0	0	0
3	2	0	0
3	2	4	0
3	2	4	1

3,241 =



Alternatively, ask a student to use squared material to demonstrate a 4-digit number as another student records the number on the place value chart.

GETTING STARTED 2:

Write the following story problem on the chalkboard:

> Michael and Stephen were painting a picket fence. After 2 hours Michael had finished painting 228 pickets and Stephen had finished painting 113 pickets. How many more pickets did Michael paint than Stephen?

Say, "What are we being asked to find? (How many more pickets did Michael paint than Stephen?) How can we find out how many more pickets were painted by Michael? (We can find the difference between the number of pickets painted by Michael and those painted by Stephen.) What must we do to find the difference? (We must subtract.) What is a clue which may help us understand that we must subtract to find the difference? (The phrase 'more...than' may help us understand that we must subtract.) Why?" ('How many more' or 'how many fewer' tell us to compare 2 amounts. When we compare 2 amounts we usually subtract.) Ask the students to write and label an example in their notebooks to represent this problem.

GETTING STARTED 2: cont'd

e.g.,

228	pickets Michael painted
-113	pickets Stephen painted
115	more pickets

Say, "How many more pickets did Michael paint than Stephen?" (Michael painted 115 more pickets than Stephen.) How can we check our answer?" (We can add the difference, 115 to the subtrahend, 113. The sum should equal the minuend.)

e.g.,

	check
228	115
-113	+113
115	228

3.03.06

3.03.06.01 **subtract two 4-digit numbers without regrouping (exchange) and check**

STRATEGY 1: Adapt Strategies 1 or 2, P.O. 3.03.01.01 (p.26S.1).

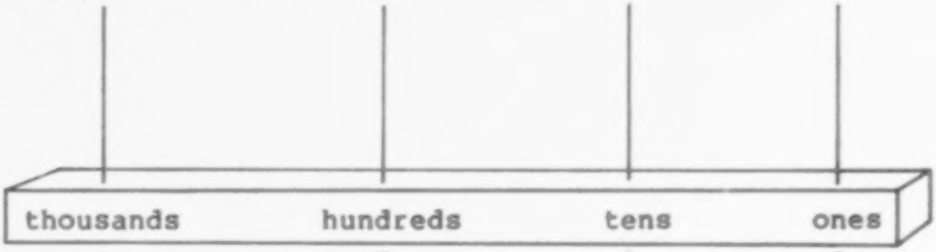
3.03.06.02 **subtract two 4-digit numbers with one regrouping (exchange) and check**

STRATEGY 1: Adapt Strategy 2, P.O. 3.03.03.03 (p.31S.4).

3.03.06.03 **subtract two 4-digit numbers with two regroupings (exchanges) and check**

STRATEGY 1: On the chalkboard draw an abacus and write a subtraction example below it.

e.g.,

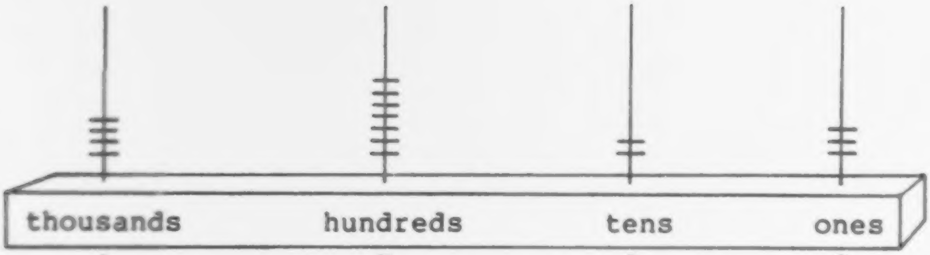


$$\begin{array}{rrrr} 4 & 7 & 2 & 3 \\ -\ 2 & 5 & 8 & 6 \\ \hline \end{array}$$

Say, "Which number is the minuend? (4,723 is the minuend.) "How many digits are in 4,723? (There are 4 digits in 4,723.) In what place are each of the digits?" (The 3 is in the ones place, the 2 is in the tens place, the 7 is in the hundreds place, and the 4 is in the thousands place.) Repeat this questioning procedure for the subtrahend, 2,586. Point to the abacus. Say, "We will use this abacus to help us subtract 2,586 from 4,723. We will draw short lines on each 'wire' of the abacus to represent 4,723."

STRATEGY 1: cont'd

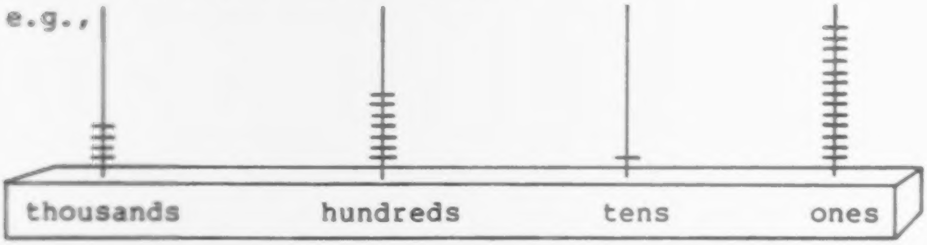
e.g.,



$$\begin{array}{rcccc} & 4 & 7 & 2 & 3 \\ - & 2 & 5 & 8 & 6 \\ \hline \end{array}$$

Say, "Let's find the difference by using the abacus. Since 2,586 is a smaller number than 4,723, we should be able to subtract. Where shall we begin? Explain. (We shall begin in the ones place. Since we cannot subtract 6 from 3, we must exchange 1 ten for 10 ones.) If we do this, does the value of 4,723 change? Explain. (No, because 1 ten equals 10 ones.) Let's show this exchange in the example and on the abacus. Then let's subtract in the ones place." Repeat this procedure for regrouping 1 hundred for 10 tens. Complete the example.

e.g.,



$$\begin{array}{rcccc} & 4 & \overset{6}{\cancel{7}} & \overset{\overset{11}{\cancel{1}}}{\cancel{2}} & \overset{13}{\cancel{3}} \\ - & 2 & 5 & 8 & 6 \\ \hline & 2 & 1 & 3 & 7 \end{array}$$

Say, "What is the difference? (The difference is 2,137.) How many times did we regroup? (We regrouped 2 times.) Why?" (The digits in the ones and tens places of the subtrahend were larger

STRATEGY 1: cont'd

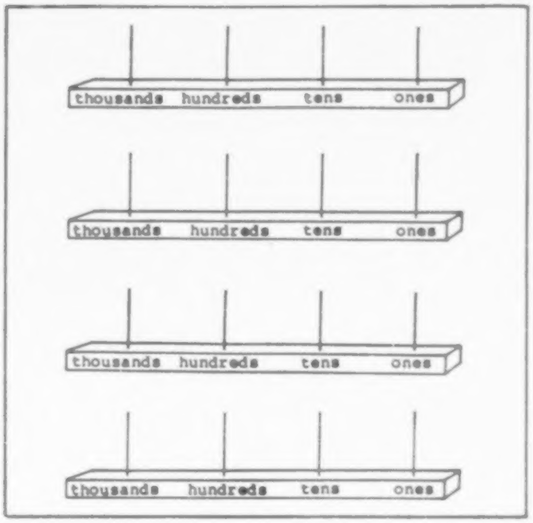
than the digits in the ones and tens places in the minuend.) Ask the students to check the answer and write the example and the check in their notebooks.

e.g.,

$$\begin{array}{rr} & \underline{\text{check}} \\ 4{,}\overset{6}{\cancel{7}}\overset{\overset{11}{\cancel{1}}}{\cancel{2}}\overset{13}{\cancel{3}} & 2{,}\overset{1}{1}\overset{1}{3}7 \\ \underline{-2{,}586} & \underline{+2{,}586} \\ 2{,}137 & 4{,}723 \end{array}$$

Note: For students who require a more concrete experience, provide a sheet with 4 abaci and space to write the examples and words designating each place on the abaci.

e.g.,


thousands
hundreds
tens
ones
thousands
hundreds
tens
ones
thousands
hundreds
tens
ones
thousands
hundreds
tens
ones

3.03.06.04 **subtract two 4-digit members with three regroupings (exchanges) and check**

STRATEGY 1: Adapt Strategies 1 and 2, P.O. 3.03.06.03.

3.03.06.05 **compute subtraction examples having minuends with multiples of 100 or 1000 and check**

STRATEGY 1: Prepare and display 2 groups of cards. Group A, the minuends, should have cards with 3-digit numbers with zeros in the ones and tens, places. Group B, the subtrahends, should have 3-digit numbers which have no zeros. Leave space to the right of each title.

3.03.06

STRATEGY 1: e.g.,
cont'd

Group A		Group B	
200	500	135	623
600	700	356	496
400	800	292	539

On the chalkboard write: $\begin{array}{r}300.\\ \underline{-162}\end{array}$ Say, "In this example, which number is the minuend? (300 is the minuend.) Where is the minuend located? (The minuend is the top number.) What do we call 162? (162 is called the subtrahend.) Where is the subtrahend? (The subtrahend is the bottom number.) Look at the number cards. Group A will be our minuends. Group B will be our subtrahends." Ask 2 students to write minuend and subtrahend respectively next to the titles, Group A and Group B.

e.g.,

Group A - minuends	Group B - subtrahends

Ask a student to select a minuend card and a subtrahend card, display it for the other students, and using the numbers on the cards, write a vertical subtraction example on the chalkboard, e.g., $\begin{array}{r}700.\\ \underline{-356}\end{array}$

For today's lesson elicit that the minuend card must have a number which is greater than the number on the subtrahend card. Say, "Let's estimate our answer. What is 356 rounded to the nearest hundred? (356 rounded to the nearest hundred is 400.) On the chalkboard write:

$$\begin{array}{c}\underline{\text{estimated answer}}\\ 700\\ \underline{-400}\end{array}$$

Ask a student to write the estimated answer on the chalkboard.

3.03.06

STRATEGY 1: e.g.,
cont'd

estimated answer

$$\begin{array}{r} 700 \\ \underline{-400} \\ 300 \end{array}$$

Say, "In which place do we begin our subtraction? (We begin in the ones place.) Can we subtract 6 from 0? Explain. (We cannot subtract 6 from 0 because 6 is greater than 0.) What can we do? (We can regroup by exchanging 1 ten for 10 ones.) Look at the tens place. How many tens are in the minuend? (There are zero tens in the minuend.) How do you think we can regroup?" Encourage the students to explore other possibilities and to explain their suggestions. When a suggestion for regrouping is given, ask the other students if they agree. If a student disagrees, ask him/her to explain. Say, "Since we cannot regroup tens for ones because there are no tens in the minuend, we must go to the hundreds place. How many tens equal 1 hundred? (Ten tens equal 1 hundred.) Let's show this regrouping in the example."

e.g.,

$$\begin{array}{r} \overset{6}{\cancel{7}}\overset{10}{\cancel{0}}0 \\ \underline{-356} \end{array}$$

Say, "If we regroup 1 hundred for 10 tens, how many hundreds are left in the minuend? (There are 6 hundreds left in the minuend.) Can we now regroup tens for ones? Explain. (Since there are now 10 tens, we can exchange 1 ten for 10 ones.) How many tens are left in the tens place? (9 tens are left in the tens place.)

e.g.,

$$\begin{array}{r} \overset{6}{\cancel{7}}\overset{\overset{9}{\cancel{10}}}{\cancel{0}}\overset{10}{\cancel{0}} \\ \underline{-356} \end{array}$$

3.03.06

STRATEGY 1: cont'd

Can we now subtract 356 from 700? Explain." (In the ones place, 6 can be subtracted from 10. In the tens place, 5 can be subtracted from 9.) Ask a student to complete the subtraction. Ask another student to check.

e.g.,

$$\begin{array}{r} \overset{6}{\cancel{7}}\overset{\overset{9}{\cancel{10}}}{\cancel{0}}\overset{10}{\cancel{0}} \\ \underline{-356} \\ 344 \end{array} \qquad \qquad \begin{array}{r} \underline{\text{check}} \\ \overset{1}{3}\overset{1}{4}4 \\ \underline{+356} \\ 700 \end{array}$$

Ask the students to compare the actual answer, 344 with the estimated answer, 400 to determine if the actual answer is reasonable.

Repeat this procedure using the other cards. When the students have demonstrated proficiency, repeat this procedure with 4-digit numbers.

Note: Squared material may be used with students for whom a more concrete experience is necessary. In this case, the students should regroup using the squared material and then show the regroupings in the example.

3.03.06.06 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare a word problem.

e.g.,

> Mrs. Gold had 3,843 dollars in her savings account. She took her family on a vacation to Cape Cod. The vacation cost 1,265 dollars. How much money does Mrs. Gold now have in her savings account?

Ask the students to read the story. Say, "What do we know about Mrs. Gold? (We know she saved 3,843 dollars. We know she took her family on vacation.

STRATEGY 1: cont'd

We know the vacation cost 1,265 dollars.) Will she have more money after the vacation or less money? Explain. (She will have less money because she spent some of her money.) What do we want to find? (We want to find how much money Mrs. Gold had in her savings account after the family vacation.) How can we determine this? Explain." (She will have less money than when she started. To find the difference between what she started with and what she now has, we must subtract.)

Ask a student to write the subtraction example on the chalkboard, label, and solve it.

e.g.,

$$\begin{array}{rl} 3,\overset{7}{\cancel{8}}\overset{13}{\cancel{4}}\overset{13}{\cancel{3}} & \text{dollars} \\ \underline{-1,265} & \text{dollars} \\ 2,578 & \text{dollars} \end{array}$$

Compare the estimate with the actual answer and discuss whether the actual answer is reasonable.

Repeat this procedure with other 4-digit numbers, with and without regrouping in 1, 2, 3, and 4 places, and with examples having minuends with multiples of 100 or 1000.

STRATEGY 2: Prepare and display several cards, each with information which can be used to create addition or subtraction word problems using 4-digit numbers.

e.g.,

Hal saved 2,385 pennies.
Pam saved 3,418 pennies.

Ken drove 6,000 miles in 1985. Ken drove 4,218 miles in 1986.

045

STRATEGY 2:
cont'd

Say, "These cards have information which can be used to write either addition or subtraction word problems. What is missing from these word problems? (The question is missing.) Today we will create subtraction word problems. We must think of questions which can be added to the information so that we will have subtraction word problems." Ask the students to read the information on the first card. Say, "What question can we ask to make this into a subtraction word problem?" Accept all reasonable responses.

e.g.,

- How many more pennies did Pam save than Hal?
- How many fewer pennies did Hal save than Pam?
- How many more pennies must Hal save to equal the amount that Pam saved?
- How many pennies must Pam give to Hal so that Hal has 3,418 pennies?
- What is the difference in the number of pennies saved by Pam and Hal?

Ask the students to write the subtraction example in their notebooks, label, and solve it.

e.g.,

$3,\overset{3}{\cancel{4}}\overset{11}{\cancel{1}}8$ Pam's pennies
$\underline{-2,386}$ Hal's pennies
1,032 difference

848

P.O. 3.03.06.01-.03

NAME: ______________________ CLASS: __________ DATE: ________

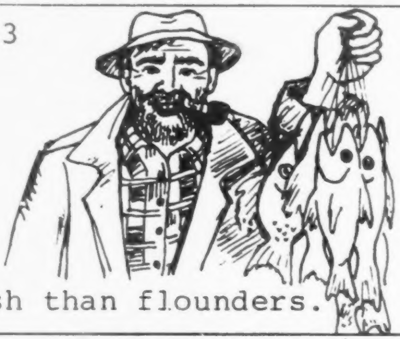
Follow the directions below.

Complete each example and check. Circle the examples which required regrouping.

4,853 -2,636 check	6,528 -3,164 check
9,249 -4,025 check	8,662 -5,435 check
7,168 -2,840 check	4,559 -2,326 check

Solve the problems.

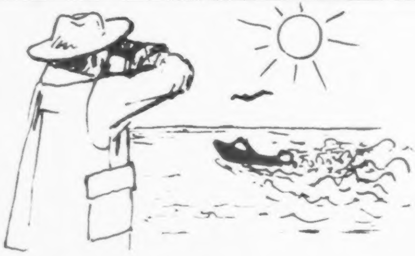
7. Captain Joe caught 5,293 flounders and 7,618 bluefish during the month of July. How many more bluefish did he catch?



solve

He caught ______ more bluefish than flounders.

8. In 1985 Captain Joe counted 6,085 speedboats in Jamaica Bay. In 1986 he counted 3,024 speedboats. What is the difference in the number of speedboats he counted?



solve

The difference in the number of speedboats is ______________.

P.O. 3.03.06.01-.04

NAME:____________________ CLASS:__________ DATE:________

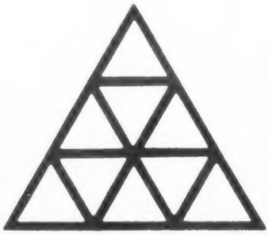
Follow the directions below.

Complete each example and check. Circle the examples which do not need regrouping.

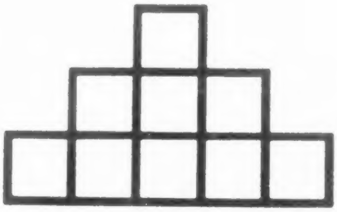
1. **check** 6,842 -2,606	2. **check** 9,413 -6,265
3. **check** 3,466 -2,145	4. **check** 5,382 -2,946
5. **check** 5,078 -3,021	6. **check** 4,218 -2,652
7. **check** 8,272 -5,585	8. **check** 2,521 -1,634

CHALLENGE!

How many triangles do you see?
I see _______ triangles.



How many squares do you see?
I see _______ squares.



P.O. 3.03.06.04-.06

NAME: ____________________ CLASS: __________ DATE: __________

Follow the directions below.

Solve each example. Check your answer on a separate sheet. Write the letter of each example above the answer to complete the message.

8,427 -5,678 ☐ E	4,000 -2,356 ☐ M	8,000 -6,584 ☐ H	3,621 -1,853 ☐ I
3,562 -1,899 ☐ A	7,435 -5,698 ☐ S	4,424 -2,686 ☐ U	9,000 -6,536 ☐ N
	5,000 -2,987 ☐ G	7,462 -2,689 ☐ T	

___ 1,644 ___ 1,663 ___ 4,773 ___ 1,416

___ 2,013 ___ 2,749 ___ 2,464 ___ 1,768 ___ 1,738 ___ 1,737

Use the information below to write a question for a subtraction problem. Solve the problem.

solve

Sam has 6,000 stamps in his album.
Ted has 3,845 stamps in his album.

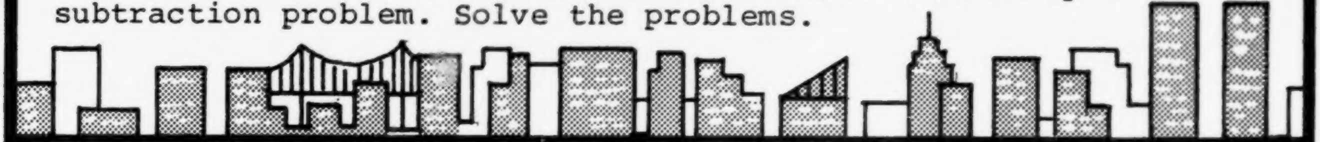
Question: ______________________________

P.O. 3.03.06.06

NAME:________________________ CLASS:__________ DATE:________

Follow the directions below.

Draw a ring around the question which makes each story a subtraction problem. Solve the problems.



1. 6,000 people visited the United Nations during December. 4,285 people visited the United Nations during January.

solve

6,000
− 4,285
....

A. How many people visited the United Nations during December and January?

B. [✓ How many more people visited the United Nations in December than in January?]

____ more people visited the United Nations in December than in January.

2. A building on Fifth Avenue in Manhattan has 2,344 offices. Around the corner, on the Avenue of the Americas, there is a building with 4,122 offices.

solve

A. What is the difference in the number of offices in the two buildings?

B. What is the total number of offices?

____..............................
....
....

3. When the circus performed in Madison Square Garden, 9,500 hot dogs were ordered. 7,885 hot dogs were sold.

solve

A. How many hot dogs were not sold?

B. How many hot dogs were ordered and sold?

____..............................
....
....

Unit 62

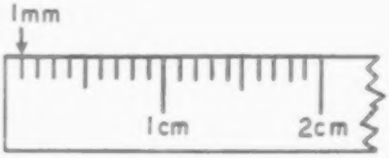
3.10.08 LINEAR MEASUREMENT - METRIC

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

3.10.08.01B identify a millimeter as a tenth of a centimeter and use the abbreviation mm; e.g.,



3.10.08.02B identify equivalent metric units of length. e.g.,

1 meter = 10 decimeters
1 meter = 100 centimeters
1 meter = 1000 millimeters
1 kilometer = 1000 meters

3.10.08

VOCABULARY

TERMS	SYMBOLS
millimeter	mm
centimeter	cm
meter	m
kilometer	km
metric unit	

GETTING STARTED 1:

Prepare and distribute colored construction paper strips of varied lengths and a metric ruler to each student or group of students. Ask the students to estimate the length, in centimeters, of each strip and then measure it using their metric rulers. Ask the students to record their responses on a chart.

e.g.,

Strip	Estimate	Actual Measurement
red	10 cm	7 cm
blue	3 cm	1 cm

GETTING STARTED 2:

Present a list of items and/or distances which can be measured in linear units.

e.g.,

How long is ...

a dollar bill?
the height of the classroom door?
your pencil?
a lady bug?
your height?
the Empire State Building?
the distance from Coney Island to the Brooklyn Bridge?

Ask the students to identify the appropriate metric unit that could be used to measure each length or distance and to state the reason for choosing that unit.

0824

3.10.08

3.10.08.01 **identify a millimeter as a tenth of a centimeter and use the abbreviation mm**

STRATEGY 1: Display a quarter and a metric ruler which is divided into millimeters. Say, "We need to measure the thickness of this quarter in metric units." What is the smallest metric unit you know? (A centimeter.) Would a centimeter be useful for measuring the thickness of this quarter? Explain." Elicit that the centimeter unit is too large to measure the coin's thickness and that a smaller unit of measure is needed. Point to the millimeter markings on the ruler. Say, "The distance between each pair of small marks is a millimeter. Look carefully and see if you can determine how many millimeters equal 1 centimeter." (10 millimeters equal 1 centimeter.) On the chalkboard write: 1 centimeter = 10 millimeters. Ask the students to copy this into their notebooks. Say, "If each centimeter is divided into 10 millimeters, what part of a centimeter is one millimeter?" (A millimeter is one-tenth of a centimeter.) Why?" (It is one-tenth of a centimeter because it is 1 of the 10 equal parts of the centimeter.) On the chalkboard write: 1 (mm) = $\frac{1}{10}$ cm. Say, "What is another way to write one-tenth?" (We can write one-tenth as a decimal, 0.1.) On the chalkboard write: 1 mm = 0.1 cm. Ask the students to write it into their notebooks. Ask a student to write the abbreviation for centimeter on the chalkboard, e.g., cm. Say and write on the chalkboard: The abbreviation for millimeter is mm. Ask the students to copy this into their notebooks.

Ask the students to estimate and then measure other items in millimeters using their metric rulers.

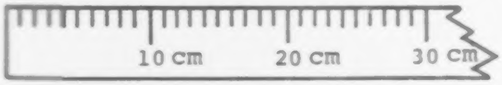
e.g.,
- the thickness of a key
- the diameter of a screw
- the diameter of a pencil
- the thickness of 2 coins

3.10.08

3.10.08.02 identify equivalent metric units of length

STRATEGY 1: Prepare and distribute a meter stick with centimeter and decimeter markings on it and lengths of string, some of which are less than a meter in length, and others which are greater than or equal to a meter in length.

e.g.,



Write the following on the chalkboard:

1 meter = ____ decimeters
1 meter = ____ centimeters
1 meter = ____ millimeters
1 kilometer = ____ meters

Ask the students to copy this chart into their notebooks. Say, "We will complete this chart. Look at your meter stick. The lines on the meter stick are of two different lengths. What do the longer lines represent? (The longer lines represent decimeters.) How can we identify 1 decimeter? (The distance between any 2 of the longer lines equals 1 decimeter.) How many decimeters are there in 1 meter?" (There are 10 decimeters in 1 meter.) Ask a student to fill in the missing information for decimeters on the chalkboard as the other students complete it in their notebooks, e.g., 1 meter = 10 decimeters. Say, "The prefix, deci means one-tenth. Therefore, a decimeter is one-tenth of a meter."

Ask the students to place one end of their string at the left end of their meter sticks and to measure the length of the string to the nearest decimeter. Say, "Write the length of your string, to the nearest decimeter, next to the phrase about decimeters in your notebook."

e.g.,

1 meter = 10 decimeters My string is about 6 decimeters long.

STRATEGY 1: cont'd

Say, "Is 6 decimeters more, less, or equal to 1 meter? (6 decimeters is less than 1 meter.)

Ask the students to exchange their yarn with a friend, measure it, and write its length, to the nearest decimeter, in their notebooks.

e.g.,

1 meter = 10 decimeters

My yarn is about 6 decimeters long.
Pat's yarn is about 11 decimeters long.

Say, "Is 11 decimeters more, less, or equal to 1 meter?" (11 decimeters is more than 1 meter.)

Repeat this procedure until the students develop an awareness of 'about' how long 10 decimeters are and that 10 decimeters equal 1 meter.

Repeat this procedure for centimeters and millimeters.

Say, "Sometimes we need to measure great distances. What are some great distances you would like to measure?" Accept all reasonable responses. Write them on the chalkboard.

e.g.,
- the distance from home to school
- the distance from New York to California
- the distance from school to the beach

Say, "The metric unit we use when measuring great distances is called the kilometer. 1 kilometer equals 1,000 meters." Ask a student to complete the statement about kilometers on the chalkboard as the other students complete it in their notebooks, e.g., 1 kilometer = 1,000 meters.

Help the students to appreciate the length of a kilometer by saying, "Think of a classroom that is 10 meters in length. If you walk across this room 100 times, you will walk a distance of 1 kilometer."

Note: Many classrooms are approximately 10 meters long.

P.O. 3.10.08.01-.02

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

Complete each sentence.

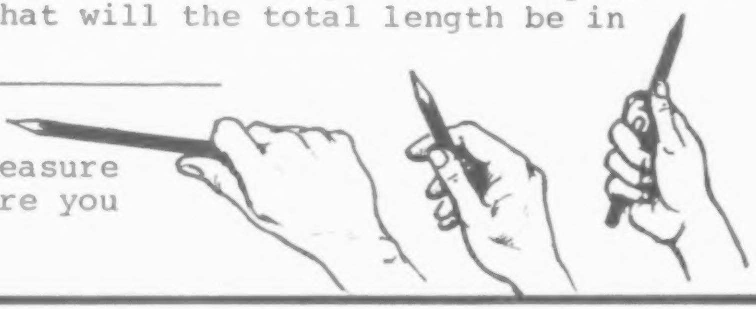
1. If the length of a table is 1 meter, it is __________ decimeters long.
2. The distance from Main St. and Elm St. to Broadway and Elm St. is 1,000 meters or __________ kilometer.
3. A dime is about the thickness of one-tenth of a centimeter or _______ millimeter.
4. A meter equals __________ centimeters.

Choose the most reasonable measurement.

5.	width of a greenbean	a. 1 mm	b. 1 cm	c. 1 m
6.	width of a student's desk	a. 1 km	b. 1 cm	c. 1 m
7.	height of a boy	a. 1 cm	b. 1 m	c. 1 mm
8.	length of a pencil	a. 1 mm	b. 1 dm	c. 1 km

Solve this problem.

Kathy's pencil is 16 cm long. Samantha's pencil is 100 mm long. Charlotte's pencil is 2 dm long. If we lay the pencils end to end, what will the total length be in centimeters? ____________________



Hint: The units of measure must be the same before you can find the total.

CHALLENGE!

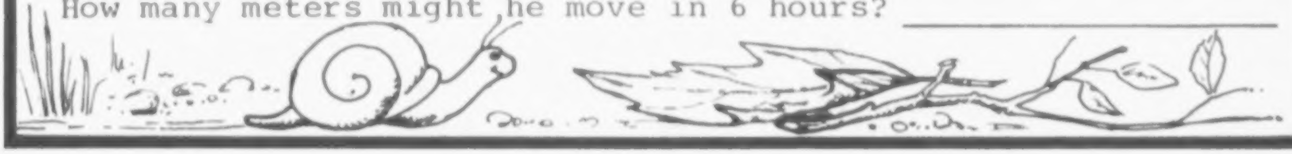
A snail moved 100 centimeters in 2 hours.

How many centimeters might he move in 3 hours? __________

How many centimeters might he move in 4 hours? __________

How many meters might he move in 4 hours? __________

How many meters might he move in 6 hours? __________



SHARPENING YOUR SKILLS

Units 61,62

Name:____________________ Class:_______ Date:____

For questions 1-4, subtract and check.

1. check

9,672
-2,361

2. check

8,763
-1,248

3. check

7,945
-2,379

4. check

5,000
-2,471

5. Find the difference. Check.

6,437 - 1,204 = ☐

6. Choose the correct answer.

8,723
-2,586

ⓐ 11,309 ⓒ 6,237

ⓑ 6,263 ⓓ 6,137

7. Choose the correct answer.

8,345
-2,897

ⓔ 6,552 ⓖ 5,448

ⓕ 6,448 ⓗ Not Here

8. Last month the Hamburger Palace sold 6,667 hamburgers. This month the Palace sold 8,341 hamburgers. How many more hamburgers did they sell this month than last month?

They sold _____ more hamburgers this month.

For questions 9 - 11, circle the correct answer in each sentence.

9. A millimeter is (greater, less) than a centimeter.

10. A millimeter is (one-tenth, one-half) of a centimeter.

11. An abbreviation for millimeter is (m, mm, cm).

12. One meter equals __ centimeters.

A meter equals ___ millimeters.

A kilometer equals 1000 _____.

Unit 63

3.09.06 POLYGONS

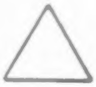
(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.09.06.01B recognize and define a polygon as a simple closed curve with line segments called sides;

e.g.,



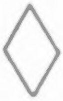
3.09.06.02B recognize and define a quadrilateral as a 4-sided polygon;

e.g.,

parallelogram

rectangle

square

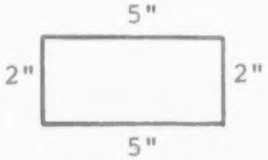


rhombus

trapezoid

3.09.06.03A define perimeter of a quadrilateral as the sum of the lengths of its sides.

e.g.,



Perimeter = 2" + 5" + 2" + 5" = 14"

Perimeter = 14"

3.09.06

VOCABULARY

TERMS

polygon
line segment
quadrilateral
parallelogram
rectangle
line
square
rhombus
trapezoid
perimeter

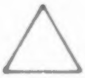
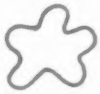
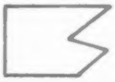
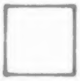
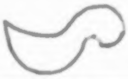
SYMBOLS

<———>
•———•

GETTING STARTED 1:

Prepare cutouts of simple closed curves, some of which are polygons. Glue the cutouts on a chart.

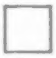
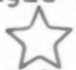
e.g.,

Simple Closed Curves		
Shape	Number of Line Segments	Number of Corners
1. 		
2. 		
3. 		
4. 		
5. 		

Ask the students to define the following terms: simple closed curves, line segment, corner. Ask the students to fill in the missing information on the chart and to explain their answer choices. Say, "Draw several simple closed curves of your own." Ask the students to compare each other's simple closed curves in terms of the number of line segments and the number of corners.

3.09.06

GETTING STARTED 2:

Display the symbol for a line (<————>) and a line segment (●————●). Say, "What is the difference between a line and a line segment?" (A line goes on and on in both directions. A line segment has 2 endpoints and is a portion of a line.) Draw a triangle on the chalkboard, e.g., . Say, "Is the triangle made of lines or of line segments? (The triangle is made of line segments.) How many line segments does the triangle have?" (The triangle has 3 line segments.) Display various shapes, e.g.,  ,  , . Ask the students to list the shapes in their notebooks and write the number of line segments they have.

e.g.,

A square has 4 line segments.
This star has 10 line segments.
A rectangle has 4 line segments.

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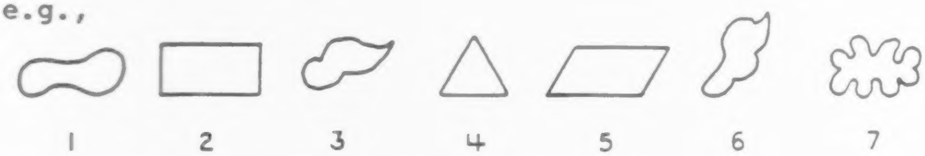
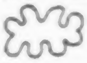
3.09.06

3.09.06.01 **recognize and define a polygon as a simple closed curve with line segments called sides**

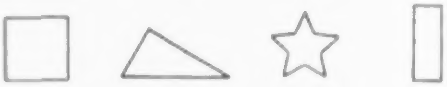
STRATEGY 1: Prepare, display, and number cutouts of simple closed curves, half of which are polygons. Number the simple closed curves.

e.g.,



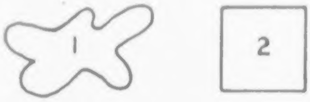
Say, "This is a group of closed curves. Some of these closed curves look similar." Display one simple closed curve that is not a polygon, e.g.,  . Say, "What other closed curves are similar to this one? (The closed curves numbered 1, 3, and 6 are similar to this one.) "What makes these curves different from those you did not select?" (The ones we did not select have straight sides and corners.) After the students discuss various properties of simple closed curves, say, "The simple closed curves with straight sides or line segments and corners are called polygons." Say and write on the chalkboard: "Polygons are simple closed curves made up of line segments called sides." Ask the students to copy this definition into their notebooks. Mix the cutouts and ask the students to determine which of the closed curves are polygons. Ask the students to write the word, polygons, in their notebooks and to draw several examples of polygons.

e.g., Polygons



STRATEGY 2: Draw and number two simple closed curves on the chalkboard. One of which is a polygon.

e.g.,



STRATEGY 2: cont'd

Say, "What is the same about these two figures?" (Both figures are simple closed curves.) What makes figure 2 different from figure 1?" (Figure 2 is made up of line segments.) Figure 2 and others like it are special simple closed curves. They are called polygons. A polygon is made up of line segments called sides." Write the word, polygon, and the definition of a polygon on the chalkboard.

e.g.,

Polygon

A polygon is a simple closed curve made up of line segments called sides.

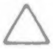
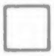
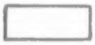
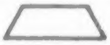
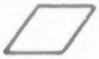
Ask the students to copy it into their notebooks. Draw several other simple closed curves on the chalkboard. Ask the students to identify the figures that are polygons. Ask the students to count the sides or line segments which make up each polygon.

3.09.06.02 **recognize and define a quadrilateral as a 4-sided polygon**

STRATEGY 1: Prepare and display a chart of polygons, including a triangle, a square, a rectangle, a parallelogram, a trapezoid, and a rhombus.

e.g.,

Polygons

Shape	Name	Number of Sides	Number of Corners
A. 			
B. 			
C. 			
D.			
E. 			
F. 			

002

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STRATEGY 1:
cont'd

Say, "Look at shape A. What is this polygon called? (It is called a triangle.) How many sides and corners does a triangle have?" (A triangle has 3 sides and 3 corners.) Ask a student to fill in the information for a triangle on the chart. Repeat this procedure until the chart is completed.

Say, "What is the same about the polygons labeled B, C, D, and F? (These polygons have 4 sides and 4 corners.) Polygons with 4 sides and 4 corners are called quadrilaterals." On the chalkboard write:

Quadrilateral

A quadrilateral is a 4-sided simple closed curve with 4 corners.

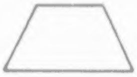
Ask the students to copy this definition into their notebooks. Circle polygons B, C, D, and F. Say, "How are these quadrilaterals different from one another?" Accept all appropriate responses.
e.g.,

Polygon F has only 2 parallel sides.
Polygon B has 4 equal sides.

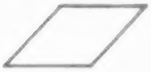
Say, "Each of these quadrilaterals has a different shape. Each has a special name to go with its shape. Can you recognize and name any of these quadrilaterals?" Accept all appropriate responses, e.g., square, rectangle ... Write and read the names of the remaining quadrilaterals (parallelogram, rhombus, trapezoid) beside each figure. Ask the students to describe each quadrilateral and to copy and label an example of each in their notebooks.
e.g.,

Special Quadrilaterals

parallelogram



trapezoid



rhombus

rectangles

STRATEGY 2: Draw a large square and a large rectangle on the chalkboard. Point to the square. Ask the students to identify objects that have the same shape. Repeat this procedure using the rectangle. Say, "How many sides does a square have? ... a rectangle?" (A square has 4 sides. A rectangle ...) Draw a picture of a parallelogram on the chalkboard.

e.g.,

Say, "This polygon has the same number of sides as the square and the rectangle. All 4-sided polygons are called quadrilaterals. There are some quadrilaterals that are special and have other names because of their shapes." Draw a square, a rectangle, a parallelogram, a rhombus and a trapezoid on the chalkboard. (See Strategy 1.) Name each shape and ask the students to state why they are all quadrilaterals and to describe their properties. Write the properties of each quadrilateral on the chalkboard.

e.g.,

Quadrilaterals

1. A parallelogram has opposite sides which are equal and parallel.
2. A square has 4 sides which are equal in length and 4 angles which are equal in size.
3. A rectangle has four equal angles. Opposite sides are parallel and equal in length.
4. A rhombus is a parallelogram with 4 sides which are equal in length.
5. A trapezoid has one pair of parallel sides.

Ask the students to draw the shapes in their notebooks and to write their properties.

3.09.06

3.09.06.03 **define perimeter of a quadrilateral as the sum of the lengths of its sides**

STRATEGY 1: Prepare and distribute rulers. Say, "Imagine that your desks are gardens. In the gardens there are beautiful flowers. How could we protect the flowers? (We could put a fence around the garden.) Where would we build the fence?" (We would build the fence around the edge of the garden.) Ask a student to show where the fence would go, using the desk as a model. Draw a model of a garden with a fence around its edge on the chalkboard. Say, "How can we determine how much fencing is needed? (Each side of the garden must be measured to determine how much fencing is needed.) Measure each side of your desk." Ask the students to record the measurements in their notebooks. Say, "How can we decide the total amount of fencing needed?" (We can add the lengths of all four sides to decide how much fencing is needed.) Ask a student to write a number sentence on the chalkboard.

e.g.,

20" + 12" + 20" + 12" = ☐

Ask a student to solve the example. Say, "We call the distance around a simple closed curve the perimeter. Since a quadrilateral has 4 sides, the perimeter is the sum of the lengths of its 4 sides." Write the word, perimeter, and its definition on the chalkboard. Ask the students to copy it into their notebooks.

Repeat this procedure with other examples.

STRATEGY 2: Prepare rulers and large cutouts of quadrilaterals for each student or group of students. Distribute the rulers. Draw a quadrilateral on the chalkboard.

e.g.,

STRATEGY 2: cont'd

Ask a student to measure and record the length of each side of the figure. Say, "The distance around the quadrilateral is called the perimeter. We find the perimeter by adding the lengths of all four sides." Ask a student to add the lengths.

e.g.,

6" + 10" + 6" + 10" = 32"

Distribute the cutouts of quadrilaterals to the students. Say, "Measure the lengths of the sides of your quadrilateral and find its perimeter. Record your answers on a chart."

e.g.,

Perimeters of Quadrilaterals

Name of Shape	Length of Side 1	Length of Side 2	Length of Side 3	Length of Side 4	Perimeter
parallelogram	6"	10"	6"	10"	32"

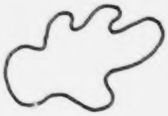
Repeat this procedure by asking the students to exchange quadrilaterals.

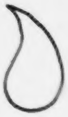
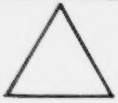
P.O. 3.09.06.01 - .03

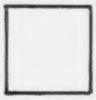
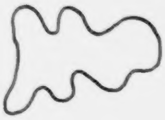
NAME:____________________ CLASS:________ DATE:_______

Follow the directions below.

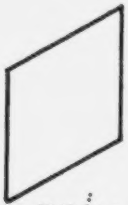
1. Here is a group of simple closed curves.
   Color the polygons red.
   Draw a blue circle around the quadrilaterals.



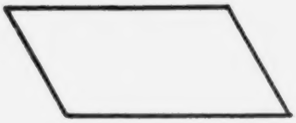



2. Name each quadrilateral.
   Color the square red.
   Color the rectangle yellow.
   Color the trapezoid blue.
   Color the rhombus orange.
   Color the parallelogram green.



rhombus



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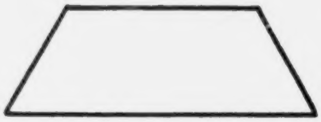

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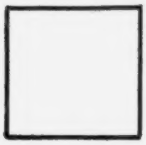

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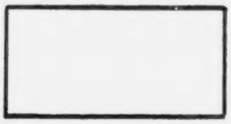
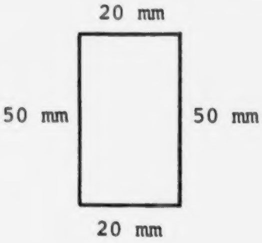
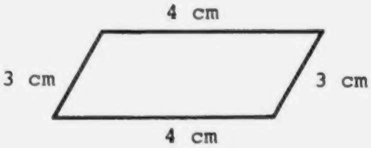


____

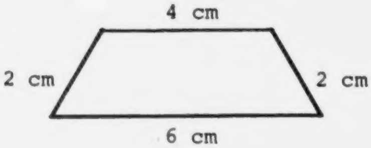
3. Find the perimeter for each quadrilateral.


20 mm
50 mm
50 mm
20 mm

P = 140mm


4 cm
3 cm
3 cm
4 cm

P = ________


4 cm
2 cm
2 cm
6 cm

P = ________

3.13.04 CREATE MODELS/CHARTS TO SOLVE PROBLEMS

(1-2 lessons)

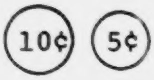
PERFORMANCE OBJECTIVES

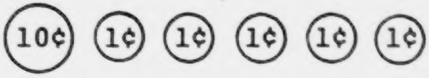
The student will be able to...

3.13.04.01A use representative materials to help solve a problem;

e.g.,

How many ways can you show 15 cents using coins?

1. 

2. 

*3.13.04.02A create charts/tables to help solve problems;

e.g.,

How many ways can you show 15 cents using coins?

Dimes	1	1				
Nickels	1		3	2	1	
Pennies		5		5	10	15
Amount	15¢	15¢	15¢	15¢	15¢	15¢

3.13.04.03A develop questions based upon information obtained from a model/chart.

e.g.,

1. Which combinations use all of the same coins?
2. Which combination uses the least number of coins?
3. Which combination uses the greatest number of coins?
4. Were we able to use all of the coins to make 15 cents?

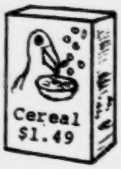
VOCABULARY

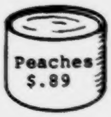
TERMS

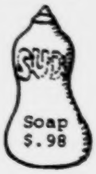
GETTING STARTED 1:

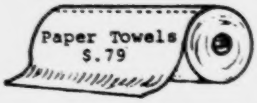
Prepare and display several grocery items with prices.

e.g.,









Say, "Where would we buy these items? (We would buy them in a grocery store or supermarket.) Let's pretend Robert just got home from school. His mother says, 'Do your homework and then you will go to the supermarket.' Robert's mother gave him a shopping list. These are the items she needed." Point to the items on display. Say, "In order for Robert to do a good job of shopping, there are several things he should know and have. What are they?" Accept all reasonable responses.

e.g.,

- He needs enough money to buy these items.
- He needs to know the total cost of the items.
- He needs to know how much change he will get.

Say, "How can we decide how much money Robert will need? (We can add the cost of all the items.) How can we decide how much change he will bring home?" (We can subtract the cost of all the items from the amount of money he had.)

Ask the students to write a word problem using all or some of this information.

GETTING STARTED 2:

On the chalkboard write a word problem which has more information than is needed to solve the problem.

GETTING STARTED 2: cont'd

e.g.,

> The distance from New York to Miami is 1,500 miles. A plane leaves New York at 8:00 A.M. and arrives in sunny Miami at 11:30 A.M. How much time does the flight take?

Say, "What are we asked to find? (We are asked to find how long it takes for the plane to go from New York to Miami.) What information are we given? (We are given the distance, 1,500 miles. We are given the time the plane leaves New York, 8:00 A.M., and the time it arrives in Miami, 11:30 A.M.) Let's think again about the question. Does the question ask about the name of the 2 cities? (No.) Do we have to know the distance between New York and Miami? (No, the distance doesn't matter.) What must we find out? (We must find out the amount of time the flight took.) The names of the cities, the distance between them, and even the fact that Miami Beach is sunny, will not help us solve the problem. These facts are extra information. In order to find the correct answer, we must find the necessary information. In this problem, what is the necessary information?" (The time the plane leaves New York and the time it arrives in Miami is the necessary information.)

Ask a student to write this information on the chalkboard.

e.g.,

plane leaves New York - 8:00 A.M.
plane arrives in Miami - 11:30 A.M.

Say, "With these two facts, can we solve the problem? (Yes, the time it takes to fly from New York to Miami is $3\frac{1}{2}$ hours.) Always look for the information that is necessary to solve the problem."

3.13.04

3.13.04.01 **use representative materials to help solve a problem**

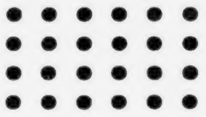
STRATEGY 1: Prepare and distribute sets of cubes to each group of students. Write a word problem on the chalkboard.

e.g.,

> Mickey, the owner of Mickey's Supermarket, likes all the groceries on the shelves to be placed in even rows. He must place 24 cans of cat food on a shelf. The shelf will hold four rows of cans. How many cans must be placed in each row so that the rows are equal?

Say, "What must we find? (We must find how many cans will be placed in each row.) What do we know? (We know that there are 24 cans and there is room for only 4 rows.) How can we use the cubes to help us solve the problem?" (We can use the cubes to represent the cans. We can arrange 24 cans in 4 rows with an equal number of cans in each row.) Ask a student to demonstrate as the other students work at their desks.

e.g.,



Say, "How many will be placed in each row on the shelves? (There will be 6 cans placed in each row.) How did the cubes help us solve the problem?" (We used them to represent the cans.)

Repeat this procedure with other word problems.

STRATEGY 2: Prepare and distribute paper thermometers to each student. Write a word problem on the chalkboard.

e.g.,

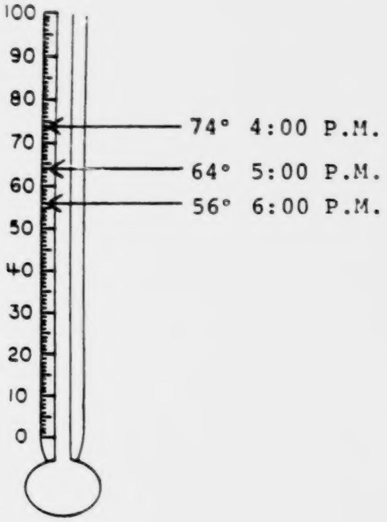
> The temperature at 4:00 P.M. on September 28, was 74°. At 5:00 P.M. the temperature had dropped 10°. By 6:00 P.M. it dropped another 8°. What was the temperature at 6:00 P.M.?

STRATEGY 2: cont'd

Say, "What does the problem ask us to find? (We must find the temperature at 6:00 P.M.) What information do we have? (We know the temperature at 4:00 P.M. and we know how much the temperature dropped each hour.) How can we use the paper thermometer to help us?" Accept all reasonable responses.

e.g.,

We can begin at 74° and count 10° down to 64° and then 8° down to 56°.



Say, "What was the temperature at 4:00 P.M.? (The temperature was 74°.) What was the temperature at 5:00 P.M.? (It was 64°.) What was the temperature at 6:00 P.M.?" (It was 56°.)

Repeat this procedure with other problems.

3.13.04.02 **create charts/tables to help solve problems**

STRATEGY 1: Prepare an incomplete chart for display and duplicated incomplete charts for each student. (See e.g., p.74S.3.) Prepare and display a word problem on the chalkboard.

STRATEGY 1: cont'd

e.g.,

Mickey, the owner of Mickey's Supermarket, wanted to know which brand of dog food was the best seller. He counted the number of cans of each brand sold. On Monday, he sold 12 cans of Tough Pup, 16 cans of Strong Dog, and 13 cans of Happy Mutt. On Tuesday, he sold 16 cans of Tough Pup, 15 cans of Strong Dog, and 17 cans of Happy Mutt. On Wednesday, he sold 25 cans of Tough Pup, 23 cans of Strong Dog, and 21 cans of Happy Mutt. Which brand was the biggest seller for the 3 days?

Say, "What are we being asked to find? (We are being asked to find which brand of dog food was the biggest seller.) There is a great deal of information in this problem. We can arrange the information on a chart. This will help us solve the problem more easily. What information should appear on a chart?" (The days of the week, the types of dog food, and the amounts sold each day should appear.) Display a chart and distribute copies of the chart to each student.

e.g.,

Dog Food Sold Each Day			
	Tough Pup	Strong Dog	Happy Mutt
Monday			
Tuesday			
Wednesday			
Total			

Together with the students, fill in the information given in the problem as they complete their charts at their desks.

3.13.04

STRATEGY 1: e.g.,
cont'd

Dog Food Sold Each Day			
	Tough Pup	Strong Dog	Happy Mutt
Monday	12	16	13
Tuesday	16	15	17
Wednesday	25	23	21
Total			

Say, "How can we decide which brand was the biggest seller for 3 days? (We can add the number of cans of dog food of each brand sold for 3 days and compare these numbers.) How much Tough Pup was sold? (53 cans of Tough Pup were sold.) Strong Dog...? (54...) Happy Mutt...? (51...) Say, "Which brand sold the most? (Strong Dog sold the most.) How did the chart help us?" (It helped us organize the information that we had.)

Repeat this procedure with other problems.

3.13.04.03 **develop questions based upon information obtained from a model/chart**

STRATEGY 1: Prepare and display a chart as per Strategy 1, P.O.3.13.04.02. Say, "A chart can help us to answer many questions. The problem for which this chart was made asked us only to find which brand sold the most. This chart can be used to answer many other questions. What are some other questions we can ask which can be answered with the information on this chart?" Accept all reasonable questions and list them on the chalkboard.

e.g.,

- How much dog food was sold on Monday? ... Tuesday? ... Wednesday?
- On which day was the most dog food sold?...the least?

STRATEGY 1: cont'd

- How much more dog food was sold on Wednesday than on Tuesday?
- How much Strong Dog, Tough Pup, and Happy Mutt were sold in 3 days?

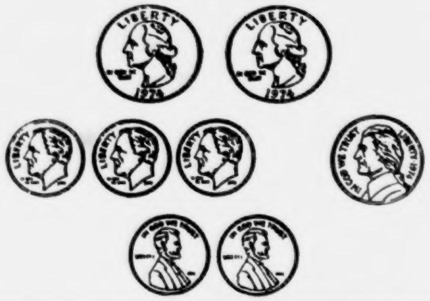
Say, "There are many questions that we can ask from information given on a chart. Different situations make us look for different information. Continue this procedure, asking students to formulate questions and find the answers by using the chart.

P.O. 3.13.04.01-.02

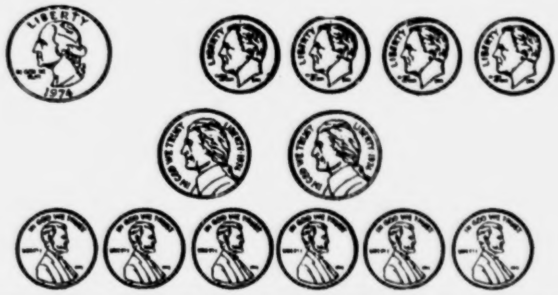
NAME:______________________________ CLASS:__________ DATE:________

Answer the questions below.

This is Sam's money.



This is Sandra's money.



1. Who has more coins? __________ has more coins.
2. Who's money has less value? __________ money has less value.
3. What is the difference in the amount of money that Sam and Sandra have? The difference is __________.
4. What is the value of the money that Sam and Sandra have together? Sam and Sandra have ______ together.
5. What is the value of Sam's and Sandra's dimes? The dimes are worth __________ cents.

Sandra paid 45¢ for a Granny Smith apple. On the chart below, show some of the combinations of coins that Sandra could have used to pay for the apple. The first one is done for you.

quarters	0					
dimes	4					
nickels	0					
pennies	5					
total	45					

P.O. 3.13.04.03

NAME: ____________ CLASS: ________ DATE: ________

Follow the directions below.

Games Won by Teams in the "A" League

	Hawks	Eagles	Bears	Panthers
December	4	6	6	7
January	4	2	6	9
February	8	5	5	3
Total	16	13	17	19

Use the chart to answer each question.

Question: Which team won the most games in February?

Answer: ____________

Question: How many fewer games did the Eagles win than the Panthers in January?

Answer: ____________

Question: What was the total number of games played in December?

Answer: ____________

Use the chart above to make up your own questions and answers.

Question: ____________

Answer: ____________

Question: ____________

Answer: ____________

Question: ____________

Answer: ____________

SHARPENING YOUR SKILLS

Units 63,64

Name:____________________ **Class:**______ **Date:**____

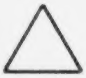
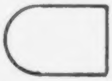
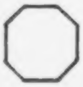
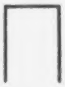
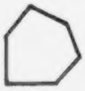
1. Use words from the box to complete each sentence.

curved	edge	solid
plane	corner	straight

A polygon is a __________ figure.

Each pair of sides in a polygon meets at a ____________ .

2. Circle the figures below which are polygons.

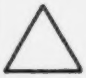
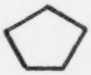
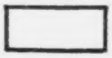
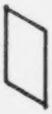
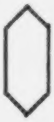
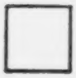






3. Use the words in the box to complete the sentence.

five	polygon	vertices
solid	pentagon	four

A quadrilateral is a _________ with ________ sides and four ____________.

4. Circle the quadrilaterals.

5. The perimeter of a quadrilateral is _______.

ⓐ the difference between its length and width.

ⓑ the sum of the lengths of its sides.

ⓒ The line which divides it into equal parts.

6. Ken is making a triangle of buttons. The first row has 1 button. The second row has 2 buttons. The third row has 3 buttons. If he continues this way, how many buttons will there be in the 6th row?

There will be ______ buttons in the 6th row.

7. Which question below cannot be answered from the information shown on the chart?

Team	Games Won	Games Lost	Games Played
Mets	60	15	75
Cardinals	56	21	77
Pirates	55	20	75
Astros	52	25	77

ⓓ How many games did the Mets play?

ⓔ How many more games did the Cardinals win than the Pirates?

ⓕ How many times did the Pirates play the Mets?

Unit 65

3.01.07 ORDINAL NUMBERS THROUGH 500

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

*3.01.07.01A use an ordinal number to name a position in a row up to 99;

e.g.,

○○○○○●○

sixth from
the left

or

second from
the right

3.01.07.02A identify the ordinal position of each object in a row or series up to 500 objects;

e.g.,

○○○○○○○○○○○○○○○○○○○●○○○○

twentieth from
the left

or

fifth from the
right

3.01.07.03B write cardinal numbers with corresponding ordinal numbers.

e.g.,

17 ——> seventeenth (17th)

3.01.07

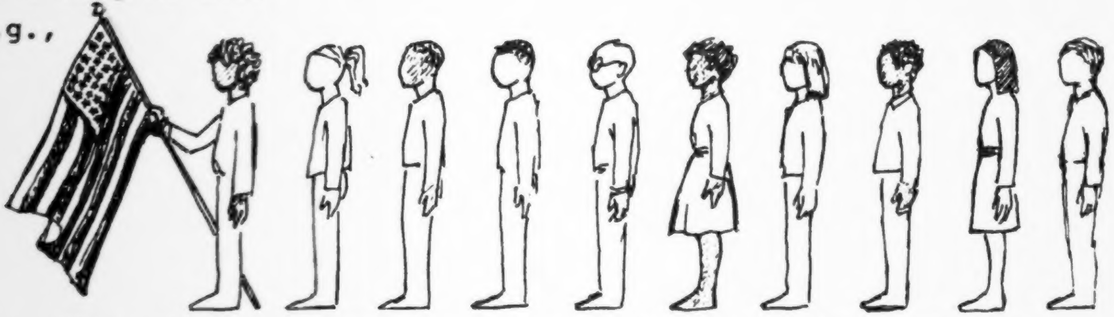
VOCABULARY

ordinal

GETTING STARTED 1:

Ask ten students to line up, one behind the other, facing one side of the room. Provide the first student with a distinctive locator such as a flag or hat.

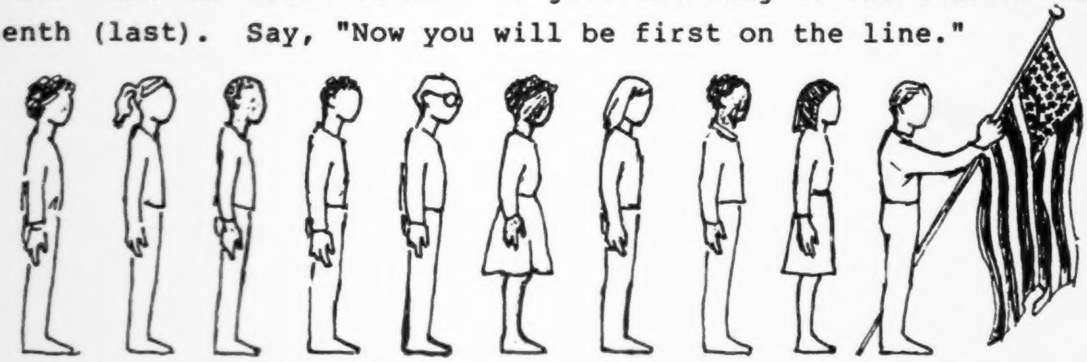
e.g.,



Say, "The student holding the flag is first on line. Who is second on line? (_____ is second on line.) Who is third on line?" (_____ is third on line.)

Repeat this activity through tenth, listing the ordinal positions first through tenth and writing the name of the student in that position. Ask the first student to give the flag to the student who was tenth (last). Say, "Now you will be first on the line."

e.g.,



Say, "Who is second on line? (_____ is second on line.) Who is third on line?" (_____ is third on line.) Again, continue the activity through tenth listing the ordinal positions first through tenth and writing the name of the student in that position.

3.01.07

GETTING STARTED 2:

Prepare and display a large blank calendar of a 30 day month. e.g.,

MARCH						
S	M	T	W	TH	F	S

Say, "This month began on a Sunday." Ask a student to come to the chalkboard and write the cardinal number on the calendar to show the first day of the month. On the chalkboard write: March 1. Say, "We write the date as March one. How do we read it?" (We read the date as March first.) Ask another student to write the numbers on the calendar which show the dates during the first week of March. Say, "A calendar shows the days and dates in order." Ask various students to complete the calendar for the month. Say, "What is the date of the last day of the month? (The last day of the month is March thirty-first.) Continue to use the calendar as a way to demonstrate the use of ordinal numbers, e.g., "Sunday is the first day of the week. March is the third month of the year". Discuss other uses of ordinal numbers.

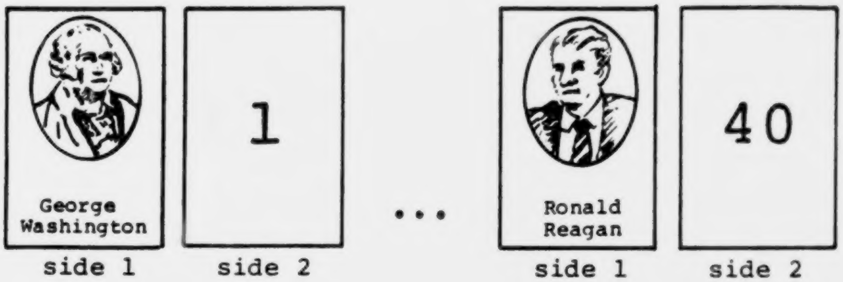
Say, "In what other ways are ordinal numbers used? Can you give examples?" (We arrange students on line as the first student, the second student, the third student... In sports, the players or teams finish first, second, third...)

3.01.07

3.01.07.01 use an ordinal number to name a position in a row up to 99

STRATEGY 1: Prepare and display, in order, the pictures and/or names of the presidents of the United States. Behind each picture or name indicate the number corresponding to the president.

e.g.,



Say, "Each of these men was a president of the United States. George Washington was the first president of the United States. The man who was president after Washington was John Adams. Adams was the second president. Who was president after Adams? (Thomas Jefferson was president after Adams.) What ordinal number can we assign to Jefferson?" (Jefferson was the third president.) Continue this procedure until all the students have had an opportunity to identify the ordinal positions of the presidents. The students may use the numeral on the back of each card to self-correct their ordinal identification of each president.

The students should conclude that the same suffixes apply to all numbers in each decade. Therefore, the ordinal designation for 20, 30, 40 ... 90 requires the suffix, "th" just as the ordinal designation for 21, 31, 41 ... 91 requires the suffix, "st". This concept is also applicable to those numbers which require the suffixes, "nd" and "rd".

3.01.07

3.01.07.02 **identify the ordinal position of each object in a row or series up to 500 objects**

STRATEGY 1: Tell the students the following story:

> A high school in Queens will graduate 500 students in June. All of these students will march down the aisle of the school auditorium and receive diplomas. The diplomas are packed in cartons which contain 100 diplomas each. Each diploma is numbered. The first diploma is numbered 1. The five-hundredth diploma is numbered 500.

On the chalkboard write:

1	1st	first
500	500th	five-hundredth

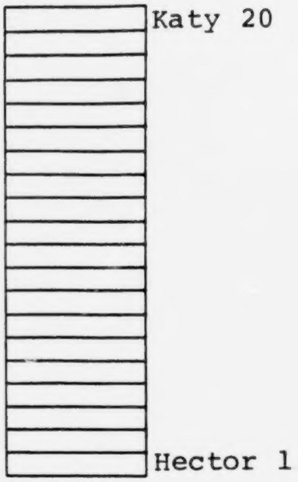
Ask the students to write this in their notebooks. Say, "What suffix is added to 500 to make it an ordinal number? (The suffix, th, is added to 500 to make it an ordinal number.) What ordinal number would we give to the student who receives the diploma numbered 100? (The student who receives diploma number 100 would be called the one-hundredth student.) What suffix was added to 100?" (The suffix, th, was added to 100.) Add 100, 100th, and one-hundredth to the chart.

Repeat this procedure for 200, 300, and 400. Elicit that all the numbers between the hundreds will have the same suffixes as they would if they were less than 100.

3.01.07.03 **write cardinal numbers with corresponding ordinal numbers**

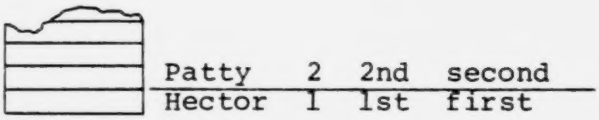
STRATEGY 1: Prepare a set of ordinal cards numbered first through twentieth and a set of numeral cards numbered 1 through 20. Display a 20-story building by taping together several sheets of paper. Write Katy at the top and Hector at the bottom.

STRATEGY 1: e.g.,
cont'd



Distribute the numeral cards, 1 to each student. Say, "I will tell you a story about Katy and Hector. Katy lives on the twentieth floor of a New York sky scraper. Hector lives on the first floor. They have friends who live on every floor in between. Patty lives on the floor above Hector. Who has the card that tells us where Patty lives?" Ask that student to display his/her card. Write "Patty" above Hector's name next to the building. Ask the student holding the card to write 2 next to Patty's name. Say, "If Hector lives on the floor numbered 1 or the first floor, where does Patty live?" (Patty lives on the floor numbered 2 or the second floor.) Write the ordinal number in digits and in words next to Hector's and Patty's names.

e.g.,

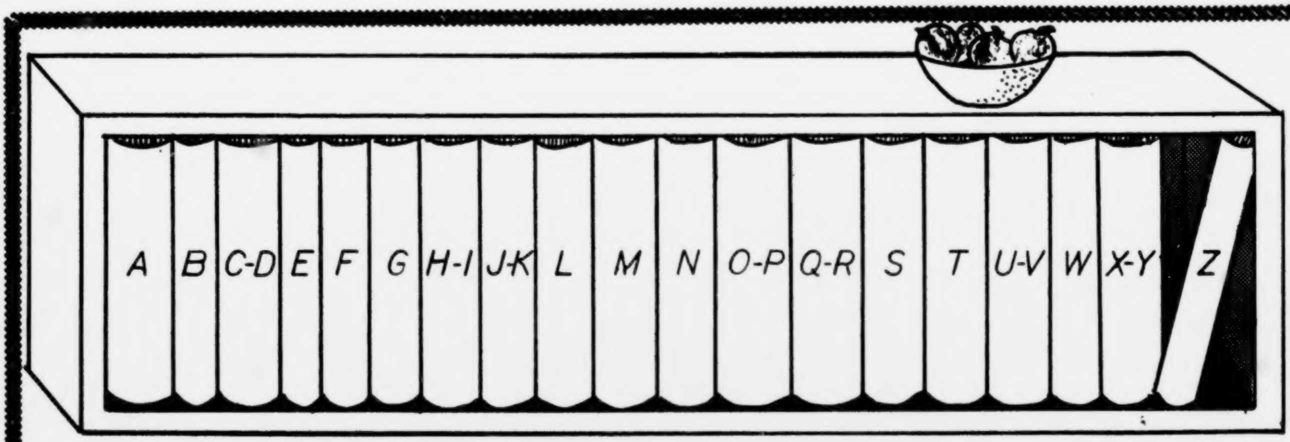


Continue this procedure through the 20th floor. More able students should write the ordinal numbers and words on the chart. Ask the students to copy this into their notebooks under the heading, Ordinal Numbers.

P.O. 3.01.07.01

NAME:____________________ CLASS:__________ DATE:________

Use the encyclopedia to practice using ordinal numbers.



1. The letters on the thirteenth volume from the left are ______________________.

2. The letters on the seventeenth volume from the right are ______________.

3. The letters on the second, fourth, ninth and fifteenth volumes spell ________________.

4. The letters on the tenth and twelfth volumes spell _________________.

5. The volumes which each have two letters are the third, _______, _______, _______, _______,_______ and eighteenth volumes.

6. The nineteenth volume from the left has letter _________________ on it.

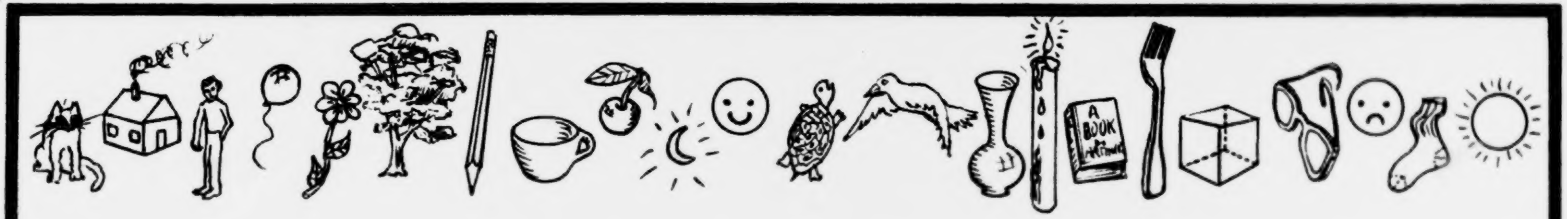
7. The nineteenth volume from the right has letter _________________ on it.

8. You can probably read about President Ronald Reagan in the ________________ and ________________ volumes from the left.

P.O. 3.01.07.02-.03

NAME: __________ CLASS: __________ DATE: __________

Complete the sentences below. Write the matching ordinal number in the column on the right.



1. The second object from the left is a house. 2nd
2. The __________ object from the right is a book. __________
3. The eighth object from the right is a __________. __________
4. The __________ object from the left is a moon. __________
5. The twelfth object from the __________ is a happy face. __________
6. The fifth object from the right is a __________. __________
7. The __________ object from the left is a box. __________
8. The tree is the __________ object from the right. __________
9. The candle is the __________ object from the left. __________
10. The sun is the __________ object from the left. __________

solve

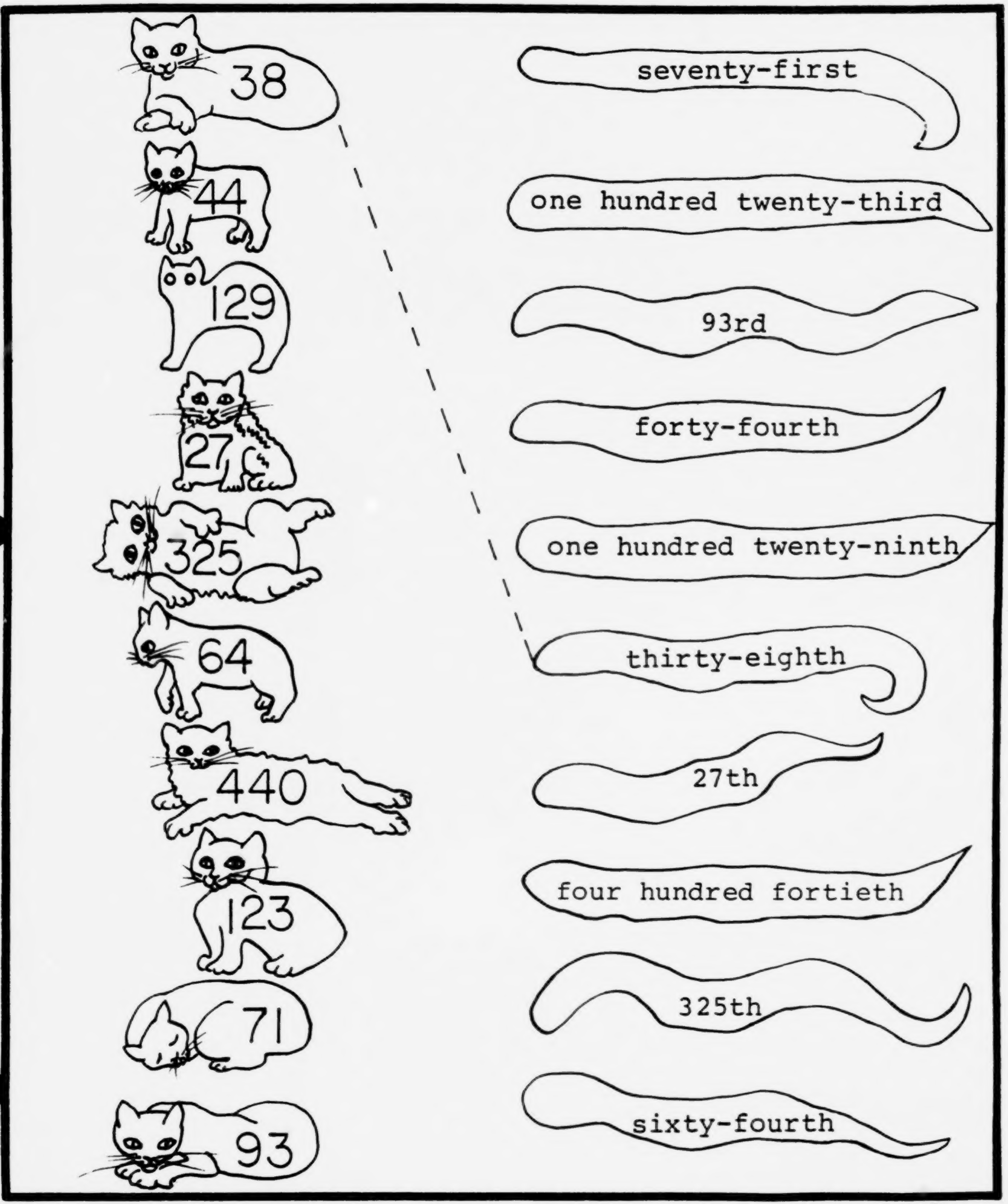
Do you remember?

Farmer Smith has 3 apple orchards. Each orchard has 231 apple trees. How many trees are in Farmer Smith's orchards?

P.O. 3.01.07.03

NAME: ______________________ CLASS: __________ DATE: ________

- Connect each cat to its tail by drawing a line from each cardinal number to its matching ordinal number.


38
44
129
27
325
64
440
123
71
93
seventy-first
one hundred twenty-third
93rd
forty-fourth
one hundred twenty-ninth
thirty-eighth
27th
four hundred fortieth
325th
sixty-fourth

Unit 66

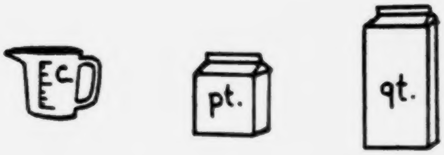
3.14.03 CUSTOMARY CAPACITY

(1 lesson/ongoing)

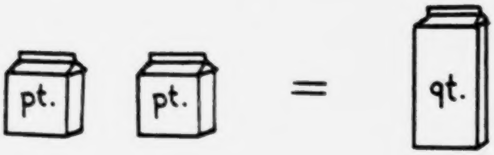
PERFORMANCE OBJECTIVES

The student will be able to...

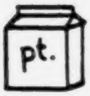
3.14.03.01 identify a cup, a pint, and a quart;
e.g.,



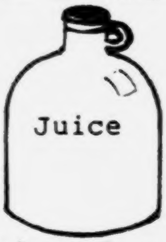
3.14.03.02 identify the relationships among a cup, a pint, and a quart;
e.g.,



3.14.03.03 estimate the capacity of a container.
e.g.,



This is a pint.



About how many pints does this juice container hold?

VOCABULARY

guess
estimate

GETTING STARTED 1:

Prepare and distribute a plastic container with a large cap to each group of students. Label each container, A, B, C, D, and E. Draw a chart on the chalkboard.
e.g.,

How Many Capfuls Does It Take To Fill Each Container?			
	Estimate	Actual	Difference
Container A			
Container B			
Container C			
Container D			
Container E			

Ask each group of students to estimate how many capfuls it will take to fill their container. Ask a student from each group to write their estimate on the chart. Say, "How can we find out if our estimates are close to the actual amount of capfuls?" (We can measure the number of capfuls by pouring them, one at a time, into our containers and tallying the number of capfuls.) After the groups have tallied the number of capfuls and written the actual amount on the chart, say, "How close was your estimate to the actual amount? Which group made the best estimate? (The group with the best estimate has the actual amount which is closest to their estimate.) What should we write in the column labeled 'Difference'? (This column should show the numbers which represent the differences between our estimates and the actual number of capfuls.) How can we determine those differences? (We can

GETTING STARTED 1: cont'd

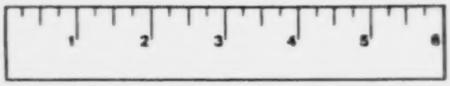
subtract the smaller number from the larger number.) How will that column show who made the best estimate?" (The group with the smallest difference will have made the best estimate.)

GETTING STARTED 2:

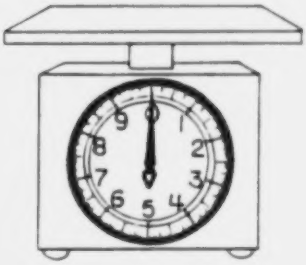
Prepare and display a 12" ruler, a yardstick, a centimeter ruler, a meter stick, a customary scale, a metric scale, a Fahrenheit and a Celsius thermometer, a clock, and a digital watch. Prepare and display the following cards: length weight time

Say, "What is the same about all of these items? (They are all measurement tools.) What is different about them?" (Some measure length, some measure weight, and some measure time.) Hold up a ruler. Say, "What could you measure with this ruler?" (We could measure the length of our desks... the chalkboard...) Repeat this procedure for all the measuring instruments. Ask the students to categorize the instruments by placing each one next to the appropriate word card. e.g.,

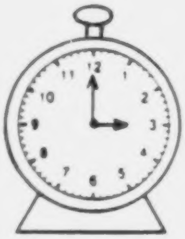
length



weight



time



3.14.03

3.14.03.01 **identify a cup, a pint, and a quart**

STRATEGY 1: Prepare and display containers which measure customary capacity (cup, pint, quart). Ask the students to name foods that are sold in standard sizes and to say how they are measured. List the foods and measures on the chalkboard.

e.g.,

Food	How Food is Measured
milk	pints, quarts, half-gallons, gallons
apples	pounds
soup	ounces, quarts, liters

Say, "Why is it important for shoppers to know the amount of food they are buying? (Shoppers should know the amount they are getting for the money they are spending.) Why do companies package their foods in containers of different sizes? (Foods are packaged in different size containers so the shoppers may choose the amount they want. If the size of the container is equal to the food it contains, the shopper easily knows how much food he/she is buying.) If I want a drink with my lunch, I would choose a small container. Which container would your parents choose if they were shopping for milk for the family?" (They would choose a large container.) Ask a student to hold up the largest container, the quart. Say, "What can you buy in the supermarket that is about this size?" Accept all reasonable responses, e.g., milk, soda, juice. Say, "About how many people might share milk from a container this size? (About 3 or 4 people.) We call this a quart." Ask a student to hold up the middle size container. Say, "What can you buy that might be in a container this size?" Accept all reasonable responses, e.g., cream, juice, yogurt. Say, "We call this a pint." Repeat this procedure for a cup.

3.14.03

STRATEGY 1: cont'd

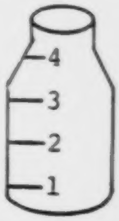
If possible, have containers available which vary in shapes but are equal to a quart, pint, or cup. Ask the students to identify their capacity and to check their responses by pouring water, tinted with food coloring, from one quart to another, one pint to another and one cup to another. Elicit that the shape of the container does not alter its capacity.

3.14.03.02 **identify the relationships among a cup, a pint, and a quart**

STRATEGY 1:

Prepare a marking pen, a cup, a pint, and a quart container. Prepare a larger, clear plastic container filled with water tinted with vegetable dye. Say, "We have learned to identify a cup, a pint, and a quart. Let's see if we can find the number of cups equal to a pint and a quart and the number of pints equal to a quart." Display the cup and the quart containers and the larger clear plastic container filled with tinted water. Say, "How can we use these containers to find the number of cups in a quart? (We can fill the cup with the tinted water and pour it into the quart container. We can repeat this until the container is filled. We can count the number of cups it took to fill the container.) Let's use the marking pen to mark each cup as it is poured."

e.g.,



Say, "How many cups are equal to 1 quart?" (4 cups equal 1 quart.) On the chalkboard write: 4 cups equal 1 quart. Ask the students to write this in their notebooks.

Repeat this activity using cups, pints and quarts. Record the students' discoveries on a chart.

3.14.03

STRATEGY 1: cont'd

e.g.,

4 cups = 1 quart
2 pints = 1 quart
2 cups = 1 pint

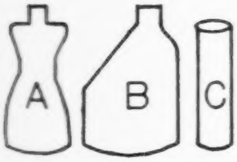
Note: Some students may need additional practice to see the relationship of quarts to cups, pints to cups and quarts to pints. Alternatives to pouring tinted water include pouring sand, rice, small beads, or dried beans.

3.14.03.03 estimate the capacity of a container

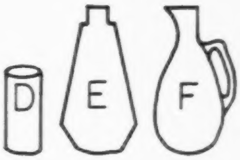
STRATEGY 1: Prepare cup, pint, quart, and gallon containers. Label the containers and distribute them to each group of students. The containers should be varied in shape.

e.g.,

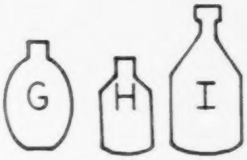
group 1



group 2



group 3



Display a chart.

e.g.,

Container	cups		pints		quarts	
	estimate	actual	estimate	actual	estimate	actual
A						
B						
C						

Ask each group to decide which standard unit of measure is most appropriate to use when measuring the capacity of their container. To clarify, relate to linear measure. Say, "How would you measure the distance from New York City to Washington D.C.?

STRATEGY 1: cont'd

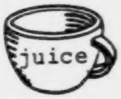
(I would measure the distance in miles.) Why wouldn't you measure the distance in feet or inches?" (Miles are very large and inches and feet are very small.) After each group has selected the appropriate unit, a cup, a pint, or a quart, say, "How many cups (pints, quarts) do you estimate it will take to fill your container?" After an estimate has been made and recorded by each group, ask them to determine the accuracy of their estimates by measuring with the standard unit.

Repeat this activity using the other containers.

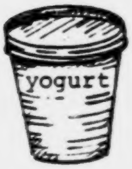
P.O. 3.14.03.02

NAME: ______________________ **CLASS:** __________ **DATE:** __________

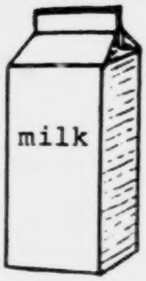
Answer the questions below.



1 cup



1 pint



1 quart

1. Which container holds exactly 2 cups?

   [✓ pint] quart

2. Which container holds less than a pint?

   cup quart

3. Which container holds more than a pint?

   cup quart

4. Which container holds 2 pints?

   cup quart

5. Which container holds 4 cups?

   pint quart

Solve the problem:

Jamie drank 1 cup of juice.
Bob drank 1 pint of juice.
Sarah drank 2 cups of juice.
Carla drank 3 cups of juice.

Together they drank ________ cups or

________ pints or ________ quarts.

3.01.08 NEGATIVE NUMBERS

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

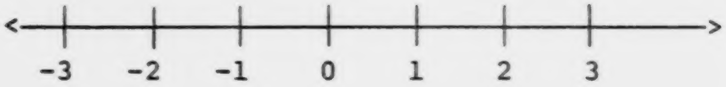
3.01.08.01B identify the negative (-) sign for numbers and use negative numbers in real life situations;
e.g.,

-6 is negative six

below zero

elevator levels below ground

3.01.08.02B locate the points for the negative numbers on a number line.
e.g.,



008

VOCABULARY

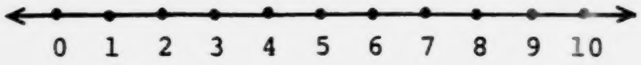
TERMS

opposite
negative

GETTING STARTED 1:

Draw a number line on the chalkboard.

e.g.,



Divide the class into Groups A and B. Ask a student from Group A to place a disc over a number on the number line, e.g., 3. Ask another student from Group A to move the disc to another number, e.g., 7. Say, "A student from Group A will describe the new location of the disc without saying the number. For example, the disc is located at 3 x 2, at 7 - 1, or at 1 + 5. If the student correctly describes the location of the disc, his/her team will score a point. Each team may describe the location of the disc in 3 different ways and score a point for each description. Therefore, a team may score either 0, 1, 2, or 3 points for each turn. Then it will be the other team's turn to move and describe the location of the disc. After each group has 5 turns we will add the points for each team. The team with the greatest number of points will be the winner."

GETTING STARTED 2:

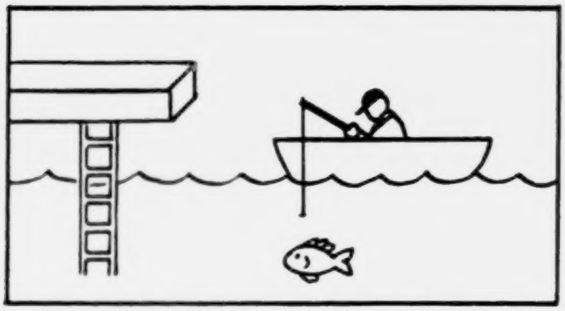
Review the rules for the game, Simon Says. Say, "We will play a new game. It is called, Simon Says the Opposite. Let's make sure we know the meaning of the word, opposite. What is the opposite of big? (Little is the opposite of big.) ...white? (Black...) ...cold? (Hot...) We will do the opposite of what Simon says to do. If Simon says 'take 5 steps forward', what should you do? (We should take 5 steps backward.) If Simon says, 'move to the left', what should you do?" (We should move to the right.)

Demonstrate by playing the role of Simon. Then give several students the opportunity to play the role of Simon.

3.01.08

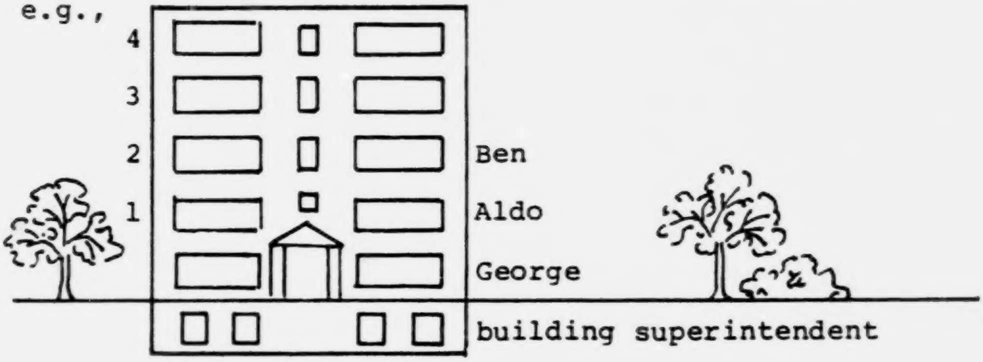
3.01.08.01 **identify the negative (-) sign for numbers and use negative numbers in real life situations**

STRATEGY 1: Say, "We have seen numbers and numerals written and used in different ways. What are some of the ways you have used numbers? (I have used the number 14 to describe the amount of pennies I saved last week. I have used the fraction, $\frac{1}{4}$ to describe the amount of pie I ate at my grandmother's house. I have used the ordinal number, third, to describe where I stand on line. When we lined up I counted by twos to see if there was an even number of students.) Today, we will identify another kind of number. It is called a negative number." Display the following:



Say, "The boat is at sea level. The dock is 5 feet above sea level. The fish is 6 feet below sea level. We can say that six feet below sea level is minus 6 feet or negative six." Display another picture.

e.g.,



Say, "Aldo lives above ground level on the first floor. Ben lives above ground level on the second

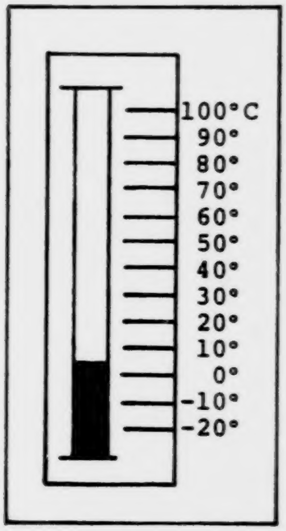
STRATEGY 1: cont'd

floor. George lives at ground level on the main floor. The building superintendent lives one floor below ground level. What is another way to say 1 floor below ground level?" (We can say that 1 floor below ground level is minus 1 or negative 1.)

Repeat this procedure using other examples to illustrate negative numbers.

STRATEGY 2: Prepare and display a Celsius ribbon thermometer showing 5°.

e.g.,



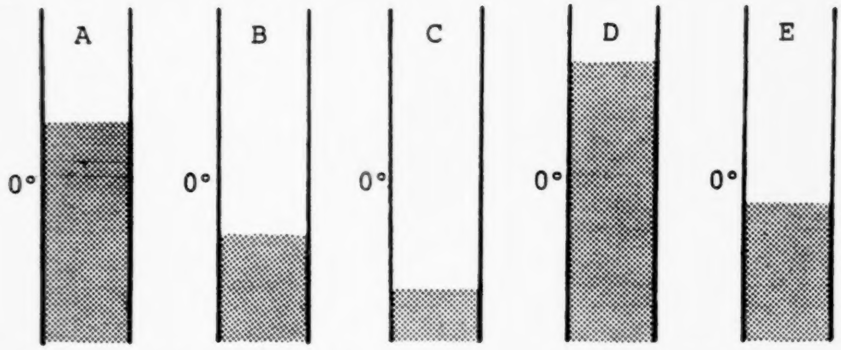
Say, "Sometimes, when I wake up on a winter morning, I know it is very cold outside. There is frost on my windows and the people outside are wearing gloves, scarves, hats, and heavy coats. The weatherman on the radio might say it is 5 degrees Celsius." Ask a student to identify the point for 5 degrees Celsius on the thermometer. Say, "When it gets even colder, water in the street can freeze. This happens when the temperature drops to 0 degrees Celsius." Ask a student to identify the point for 0 degrees Celsius on the thermometer and to move the ribbon so that the end of the red portion is aligned with 0 degrees.

3.01.08

STRATEGY 2: cont'd

Say, "In which direction would the red part of the ribbon move if it were to get even colder?" (The red part would move downward, below zero.) On the chalkboard draw several facsimiles of ribbon thermometers.

e.g.,



Say, "For which of these thermometers would you use a negative number to describe the temperature?" (I would use a negative number to describe the temperatures on B, C, and E.)

Say, "If the temperature is 5 degrees Celsius below zero, we can say it is minus 5 degrees Celsius. It is written with a minus symbol to the left of the number." Demonstrate. Say, "Another way of saying minus 5 is negative 5. However, when we talk about temperature, we say minus 5° Celsius." Ask several students to determine whether the temperature is above or below zero as the ribbon is adjusted above and below zero on the ribbon thermometer.

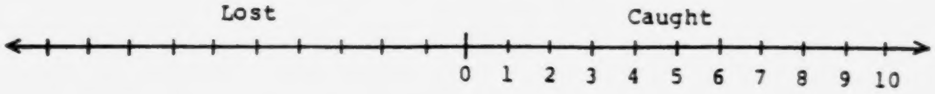
On the chalkboard write the following: -10°C, 0°C, -6°C, 20°C, -12°C, 15°C. Ask the students to read these temperatures aloud and adjust the ribbon on the thermometer to indicate each temperature.

3.01.08.02 **locate the points for the negative numbers on a number line**

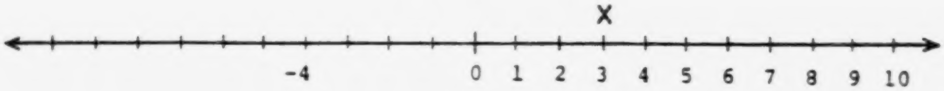
STRATEGY 1: Prepare and display a number line labeling only point zero and positive numbers through 10. Provide points for negative numbers through 10. Label the positive

STRATEGY 1:
cont'd

side "caught" and the negative side "lost."
e.g.,



Say, "Roger loves fishing. He goes fishing each day. On some days he catches fish. On other days the fish eat his worms, get away, and Roger goes home empty-handed. On Monday, Roger caught 3 fish." Ask a student to place his/her finger on the number line where this would be shown. Ask another student to place an X above this point. After the student places an X above the 3, say, "On Tuesday Roger lost 4 worms. He didn't catch any fish. He went home empty-handed. To show this on the number line, we must begin at zero and count 4 points to the left. We can use the negative symbol with this 4 to show that 4 fish got away. It was not a gain. It was a loss." On the number line write -4 in the appropriate place.
e.g.,



Ask the students to label the other points on the number line which are to the left of the 0. After the students complete the labeling, say, "On Wednesday Roger lost 7 worms without catching a fish. Where would this be indicated on the number line?" (This would be at minus 7.)

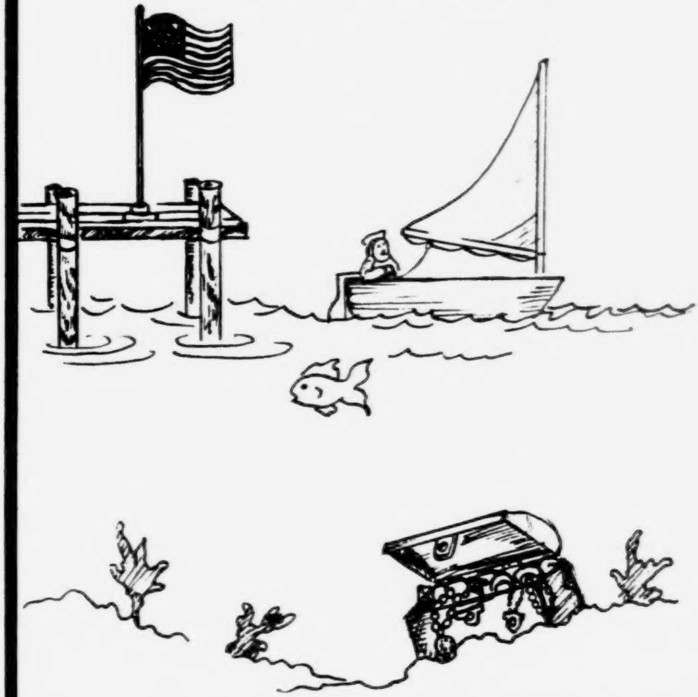
Repeat this procedure using other positive and negative numbers.

P.O. 3.01.08.01

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

Look at the picture. Complete the sentences by circling the correct words or numbers.



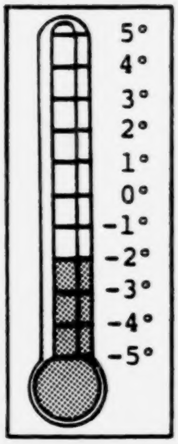
1. The sailboat is ([✓ at], above, below) sea-level.

2. The flag is flying (above, below) sea-level.

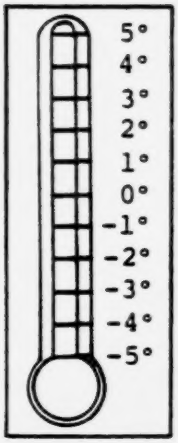
3. An (odd, even, negative) number would best describe the fish 2 feet below sea-level.

4. The sunken chest is 10 feet below sea-level. Therefore, it is (0, 10, -10).

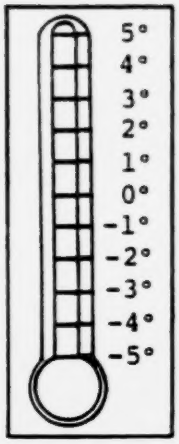
Read the temperature below each thermometer. Color in each thermometer to show the temperature. The first one is done for you.



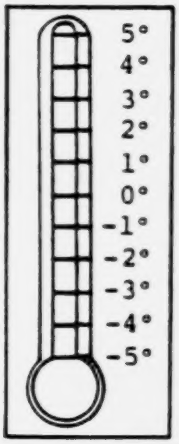
-2°



5°



-4°

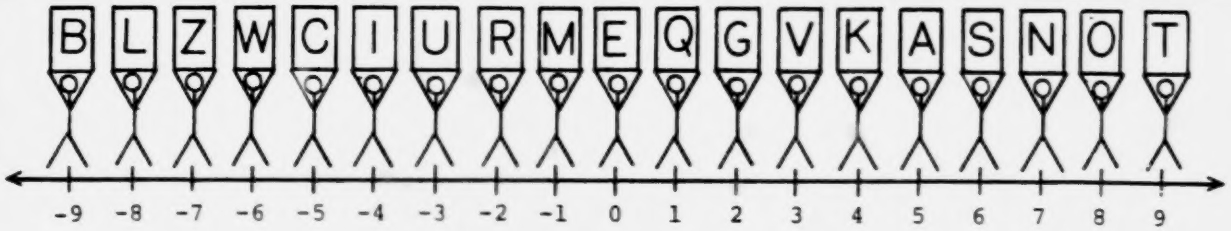


-1°

P.O. 3.01.08.02

NAME: ______________________ CLASS: __________ DATE: ________

Solve the word puzzle by placing the students' letter cards in the correct boxes below.



Word Puzzle

☐ ☐   ☐ ☐ ☐   ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

-6 0   5 -2 0   -8 0 5 -2 7 -4 7 2

☐ ☐ ☐ ☐ ☐

5 -9 8 -3 9

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐   ☐ ☐ ☐ ☐ ☐ ☐ ☐

7 0 2 5 9 -4 3 0   7 -3 -1 -9 0 -2 6

CHALLENGE!

A diver enters the water from a boat at sea-level. She dives 12 feet down to a sunken ship. Then she dives another 5 feet down to collect shells. Finally, she dives another 7 feet down to take pictures of fish. How many feet below sea-level is the diver?

______________ feet

SHARPENING YOUR SKILLS

Units 65,66,67

Name:____________________ Class:______ Date:____

① Help Forgetful Freddie remember. Fill in the blanks.

1 pint = _____ cups

2 pints = 1 _____

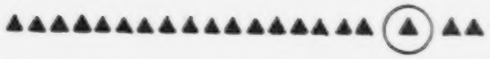
4 cups = 2 _____

4 cups = 1 _____

8 cups = _____ quarts

1 quart = _____ pints

② Which ▲ is circled?



ⓐ first

ⓒ twentieth

ⓑ eighteenth

ⓓ seventeenth

③ Write the ordinal number for each cardinal number below.

12 ____________________

4 ____________________

73 ____________________

45 ____________________

④ How many pints equal 2 quarts?

ⓔ 1

ⓖ 4

ⓕ 2

ⓗ 8

⑥ Write the numbers which represent the following:

ⓐ seven degrees below zero ______

ⓑ three floors below ground level ______

ⓒ five floors above ground level ______

ⓓ the number to the left of -2 on the number line_____

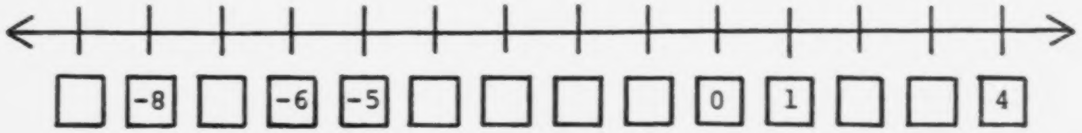
⑦ Write the ordinal numbers which come before and after each number below.

41st 42nd 43rd

__________ 125th __________

__________ 351st __________

⑤ Complete the number line.



Unit 68

3.01.09 ROMAN NUMERALS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.01.09.01B identify and write Roman numerals from XIII through XXXIX (13 through 39);

e.g.,

20 = XX
39 = XXXIX

3.01.09.02B solve word problems related to skills learned in this module.

e.g.,

> Gerry just finished reading page XXIII in his computer book. What page comes next?

3.01.09

VOCABULARY

TERMS

Roman numeral

GETTING STARTED 1:

Say, "Our numerals are called Arabic numerals. Long ago, the Romans used special symbols to represent numbers. What do we call these symbols? (We call these symbols Roman numerals.) To represent number 1, they used the symbol, I. To represent number 2, they used the symbol, II." How did they show 3?" (They wrote I, 3 times.) Write these symbols on the chalkboard. Ask the students to write the Arabic numerals, 1, 2, 3, and the Roman numerals, I, II, III in their notebooks under the title, Roman Numerals.

e.g.,

Roman Numerals

1 = I
2 = II
3 = III

Say, "Let's skip 4 for now and go to 5 What did they use to represent 5? (They used a V to represent the numeral, 5.) The Romans did not write four of the same symbols together because the number would get very long. How was the number 4 represented? Explain. (Number 4 was represented by writing I to the left of the V.) When 2 different letters are written together and the letter on the left has a smaller value, we subtract to determine the value of the letters. Therefore IV means 5 minus 1 and is equal to 4 or IV = 4." Add 4 = IV and 5 = V to the chart on the chalkboard. Ask the students to copy this into their notebooks. Say, "How did they write 6? (They wrote I to the right of the V.) When 2 different letters are written together and the letter on the right has a smaller value, we add the values of the letters. Therefore, V plus I = 6 or VI = 6." On the chalkboard write: 6 = VI. Ask the students to write this in their notebooks. On the chalkboard write the numerals 7 and 8 and their corresponding Roman numerals, VII and VIII. Reinforce the concept that VII and VIII derive their value similarly to VI.

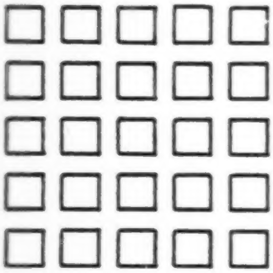
GETTING STARTED 1: cont'd

Repeat this procedure for IX = 9, X = 10, XI = 11, and XII = 12. Ask the students to copy these numbers in a list into their notebooks.

GETTING STARTED 2:

Prepare decks of 25 cards, thirteen numbered from 1 through 13 in Arabic numerals, and twelve numbered from I through XII in Roman numerals. Distribute the cards to groups of 4 students. Ask the students to place the cards, face down, in a 5 x 5 array.

e.g.,



Say, "We will play Roman Concentration. Turn one card over. Read the numeral. Then turn another card over and try to find its match." Hold up two matching cards.

e.g.,

Say, "If you find the matching numeral, you keep the two cards and get another turn. If you don't find the matching numeral, replace the cards, and the next person will have a turn. Try to remember where you saw the cards. The player with the most cards at the end of the game is the winner." Ask the students to play until all the cards are gone.

Note: We use 25 cards even though only 24 cards can be paired. The 25th card is included so there will be a challenge even for the final matched pair. Although a tie game is unlikely, should it occur, the game should be replayed until there is a winner.

3.01.09

3.01.09.01 **identify and write Roman numerals from XIII through XXXIX (13 through 39)**

STRATEGY 1: Prepare 9 Roman numeral cards; four cards with an I on each, one card with a V on it, and four cards with an X on each.

Say, "Our numerals, which include the digits, 0 through 9, are called Arabic numerals. To count to any number in our system, we use one or more of the digits, 0 through 9. We know that the Romans used other symbols to write numbers. What symbols do you know that were used by the Romans? (Some of the symbols used by the Romans are, I, V, and X.) We have seen how the symbols I, V, and X can be used to count to 12. These same symbols can be used to write numbers through 39." Review the rules for writing Roman numerals, as outlined in Getting Started 1. Ask the students to open their notebooks to the page which has the Roman numeral chart. (Getting Started 1)

Display the Roman numeral cards. Say, "Let's use these cards to learn and write Roman numerals through 39. Continue numbering your page through 39."

e.g.,

Roman Numerals

1 = I
2 = II
3 = III
.
.
.
13

14
15
16
.
.
.
26

27
28
29
.
.
.
39

Say, "I will ask a student to choose and arrange Roman numeral cards which represent the number 13. That student will place them on the chalk ledge and explain why he/she chose those cards. Another student will write the Arabic numeral and the Roman numeral on the chalkboard. The students at their desks will write this into their notebooks. After

STRATEGY 1: cont'd

each Arabic and Roman numeral is written, those students will each choose another student to take their places. We will continue until we have written the numbers through 39." Ask each student to explain why their Roman numeral is written as it is, e.g., XIII equals 13 because X equals 10, I equals 1 and 10 plus 1 plus 1 plus 1 equals 13.

Reverse this procedure by presenting Roman numerals and asking the students to write the equivalent Arabic numeral.

3.01.09.02 solve word problems related to skills learned in this module

STRATEGY 1:

Say, "Sometimes all or some of the pages of a book are numbered in Roman numerals. Display a word problem.

e.g., Stanley is reading a book. The first part of the book is numbered from I through XXXII. Stanley has read to page XXVII. How many more pages must he read to finish the first part of the book?

Ask a student to read the problem aloud. Say, "How can we solve this problem? (First we must change the Roman numerals to Arabic numerals.) What does XXXII equal? (XXXII equals 32.) What does XXVII equal? (XXVII equals 27.) What must we do next? (We must decide how to solve the problem.) What information will help us solve the problem? (We know there are 32 pages in the first part of the book. We know that Stanley has already read 27 pages.) Another way to find how many more pages Stanley must read is to think about the difference between the number of pages Stanley has read and the number of pages Stanley has left to read? How does this help us decide how to solve the problem?" (When we want to know the difference between one amount and another,

STRATEGY 1: cont'd

we must subtract.) Ask a student to write the appropriate subtraction example on the chalkboard in Roman and Arabic numerals, and in horizontal format. Say, "Rewrite the example in vertical format, solve, and label it.

e.g.,

XXXII - XXVII = ☐
32 - 27 = ☐

$$\begin{array}{r} 32 \\ \underline{-27} \end{array}$$

5 pages left

Ask a student to write V and 5 in each appropriate box to complete the number sentences.

STRATEGY 2: Display a word problem.

e.g., Last night Susie read several chapters in her book. She began reading Chapter VI and finally went to sleep when she finished Chapter XXXI. How many chapters did she read last night?

Ask a student to read this problem aloud. Say, "What do we have to find? (We have to find the number of chapters Susie read.) What information does the problem give us? (The problem tells us the chapter numbers at which Susie began and finished.) What were they? (She started at Chapter VI which is 6 and finished reading through Chapter XXXI which is 31.) How can we solve the problem?" (We can list all the chapters from 6 through 31.) Ask a student to write this list on the chalkboard, e.g., VI, VII, VIII, IX ...

Say, "Can anyone think of another way to solve it? (We could subtract 6 from 31.) What was your answer when you made a list? (We found that she read 26 chapters.) What did you find when you subtracted? (We found that she read 25 chapters.) Why were the answers different? (We have to add one more chapter because Susie read chapter 6 also.) Therefore, Susie read 26 chapters in all."

Repeat this procedure with other word problems.

P.O. 3.01.09.01

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

Change each Arabic numeral to a Roman numeral.

27 = XXVII   6 = ________   25 = ________

39 = ________   32 = ________   16 = ________

18 = ________   20 = ________   11 = ________

12 = ________   36 = ________   8 = ________

Change each Roman numeral to an Arabic numeral.

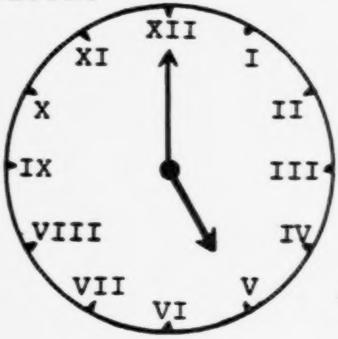
VII = 7   XXXIII = ______   III = ______

XVII = ______   XV = ______   VIII = ______

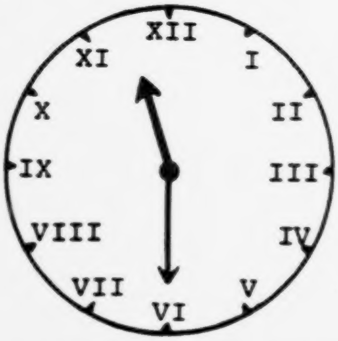
XXVII = ______   XXXV = ______   XIV = ______

XXXVII = ______   XXII = ______   XIX = ______

Write the time shown on each clock.

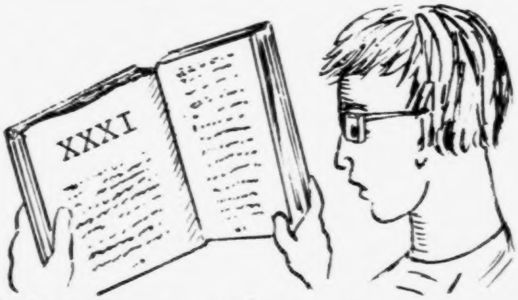

XII
I
II
III
IV
V
VI
VII
VIII
IX
X
XI

____

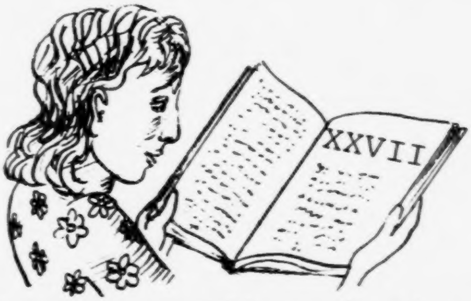

XII
I
II
III
IV
V
VI
VII
VIII
IX
X
XI

____

What chapter is each student reading?



Billy is reading chapter _____.



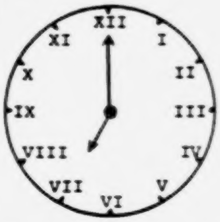
Mary is reading chapter _____.

P.O. 3.01.09.02

NAME: ______________________ CLASS: __________ DATE: ________

Solve the problems below. Write the answers in Arabic numerals.

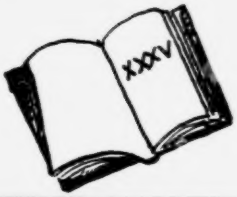
①



This clock shows the time that Sarah began her homework. She will spend a total of 2 hours on her homework. What time will Sarah finish her homework?

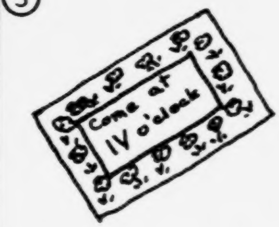
__________ o'clock

②



Jessie is reading chapter XXXV of her book.
What chapter came before this one?
Chapter __________ came before this one.
What is the number of the next one?
The next chapter is chapter__________.

③



Jenny sent a message to some of her friends. It said: Come to my house at IV o'clock. I have invited XXXVI boys and girls.
At what time should they meet?
They should meet at __________ o'clock.
How many children will be there?
There will be __________boys and girls.

④

A long time ago, in the year, XXXVIII, a man fell off a camel, the camel ran away, and the man walked XIV miles in the desert before finding water.
In what year did he fall off the camel?
He fell off the camel in the year, ________.
How many miles did he walk?
He walked __________ miles.

Do you remember?

Each number is 1,802 less than the number before it. Find the missing numbers.

solve **check**

8,212, 6,410, _________,

_________, 1,004

Unit 69

3.10.09 CAPACITY - METRIC

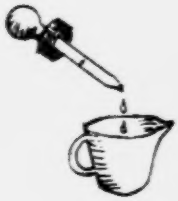
(1 lesson)

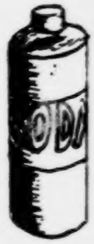
PERFORMANCE OBJECTIVES

The student will be able to...

3.10.09.01B identify and compare the milliliter (mℓ) to the liter (ℓ);

e.g.,





1,000 milliliters = 1 liter
(mℓ) (ℓ)

3.10.09.02B identify equivalent metric units of capacity.

e.g.,

1 liter = 10 deciliters
1 liter = 100 centiliters
1 liter = 1,000 milliliters
1 kiloliter = 1,000 liters

3.10.09

VOCABULARY

TERMS	SYMBOLS
milliliter	mℓ
liter	ℓ
kiloliter	kℓ
centiliter	cℓ
deciliter	dℓ
capacity	

GETTING STARTED 1:

Display a large container and 10 to 15 paper cups filled with colored water. Place the paper cups next to the large container. Say, "How many of these cups of water do you think it will take to fill this container?" Record the students' estimates on the chalkboard. Ask a student to pour the cups of water into the container, one at a time. Ask another student to count the number of cups used to fill the container. Circle the closest estimate on the chalkboard. Say, "When we poured the water into the container, we measured the capacity of the container. What do you think capacity means? (Capacity is the amount a container can hold.) What is the capacity of this container?" (The capacity of this container is ____ paper cups.)

Repeat this procedure using containers of varied sizes.

GETTING STARTED 2:

Prepare and display various empty containers.
e.g.,

2-liter soda bottle   thimble
2-quart juice carton   soup can

Say, "These containers hold different liquids. Are they all the same size and shape? Explain. (No, some containers are large, some are small, some are cylinders, and some are similar to rectangular solids.) When we measure the amount a container can hold, the measurement is called capacity. Let's compare the capacities of these

GETTING STARTED 2: cont'd

containers. Which of these containers do you think holds the most liquid? (The soda bottle holds the most liquid.) Why? (It is the largest container.) Which of these containers do you think holds the least liquid? (The thimble holds the least liquid because it is the smallest container.) If you want to buy orange juice for your family of 5, which size container would be best?" Accept all reasonable responses. Ask the students to explain their responses. Where the students disagree, ask them to pour liquid from a smaller container into the containers in question and to count the number of smaller containers it takes to fill each of the larger containers. Ask other questions which require the students to estimate capacities and compare containers.

On the chalkboard make a list of the students' responses. Ask the students to copy it into their notebooks.
e.g.,

Capacity

- The 2-liter soda bottle holds the most.
- The thimble holds the least.

3.10.09

3.10.09.01 **identify and compare the milliliter (mℓ) to the liter (ℓ)**

STRATEGY 1: Prepare and display a liter box and 100 centimeter cubes. Hold up the liter box. Say, "This is called a liter box. Why do you think it is called a liter box? (It has a capacity of one liter.) What do you think would happen if we filled a liter bottle with water and poured it into this box?" (The water would fill the box.) Hold up a centimeter cube. Say, "This is a centimeter cube. Is it larger or smaller than the liter box? (It is smaller than the liter box.) If this centimeter cube were a tiny container, it's capacity would be 1 milliliter. If we could fill this centimeter cube with water we would have 1 milliliter of water. How can we determine how many milliliters there are in 1 liter? (If we fill the liter box with centimeter cubes, we will know how many milliliters there are in 1 liter.) Before we do that, let's try to estimate how many centimeter cubes it will take to fill the box." Ask the students to estimate the number of cubes and to write their estimates on the chalkboard.

e.g.,

estimates
500
100
1,000
356

Ask a student to line the bottom of the box with centimeter cubes, arranged without gaps. Say, "How many rows of cubes did we use? (We used 10 rows of cubes.) How many cubes are in each row? (There are 10 cubes in each row.) How many cubes are there in all? (There are 10 rows of 10 cubes or there are 100

STRATEGY 1: cont'd

cubes in all.) Is the box filled to the top?" (No, it still needs more cubes.) Ask a student to stack centimeter cubes, one on top of the other, to determine how many layers it will take to fill the box to the top. Say, "If it takes 10 layers of 100 cubes to fill the box, how many cubes is that in all? (10 layers with 100 cubes in each layer equals 1,000 cubes in all.) How many milliliters would it take to equal 1 liter?" (It would take 1,000 milliliters to equal 1 liter.) Write the following on the chalkboard and ask the students to copy it into their notebooks: 1,000 milliliters = 1 liter.

Ask the students to discuss their estimates in relationship to the actual amount. Write the abbreviations for liter (ℓ) and milliliter (mℓ) on the chalkboard and ask the students to write them in their notebooks.

3.10.09.02 **identify equivalent metric units of capacity**

STRATEGY 1: Prepare and display two sets of cards, one set containing metric prefixes and the other set containing metric unit names.

e.g.,

prefix

milli

centi

deci

kilo

root

meter

gram

liter

Say, "We have learned that root words can have prefixes or suffixes added to them. The prefixes milli, centi, deci, and kilo may be added to meter, gram, and liter to form many words used in the metric system. Ask a student to hold up the "milli" card and the "meter" card. Say, "If we combine this prefix

STRATEGY 1:
cont'd

and this root what word do we have? (We have the word millimeter. What do we know about a millimeter? (There are 1,000 millimeters in a meter.) The prefix, milli, means $\frac{1}{1,000}$. We saw that 1,000 centimeter cubes fit into a liter box. What do you think a milliliter is? (It is $\frac{1}{1,000}$ of a liter.) $\frac{1}{1,000}$ of a liter is a very small amount. A milliliter is about 2 or 3 drops of liquid." On the chalkboard write:

1 milliliter (mℓ) = $\frac{1}{1,000}$
1 liter (ℓ) = 1,000 milliliters (mℓ)

Repeat this procedure for "centi", "deci", and "kilo". Ask the students to relate these amounts to something in the environment. Turn the cards face down on a desk and ask the students to choose one card from each stack and describe the amount they have chosen.

e.g.,

kilo	liter

1 kiloliter is equal to 1,000 liters. A large tank of water may hold 1 kiloliter.

Repeat this procedure until all the prefixes and all the roots have been paired. Write this information on the chalkboard and ask the students to copy it into their notebooks.

e.g.,

$1\ell = 1,000\ m\ell$
$1\ell = 100\ c\ell$
$1\ell = 10\ d\ell$
$1\ k\ell = 1,000\ \ell$

P.O. 3.10.09.01 - .02

NAME: ________________________ CLASS: __________ DATE: ________

Follow the directions below.

For each sentence below, fill in the blanks.

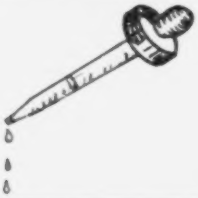
1 liter = ______ deciliters .

1 liter = 100 ____________.

1 kiloliter = 1,000 ________.

1 ________ = 1,000 milliliters.

Write the name of the unit you would use to measure the capacity of each item below: milliliter, centiliter, liter, or kiloliter.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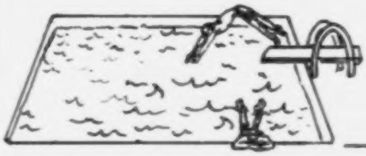
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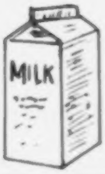

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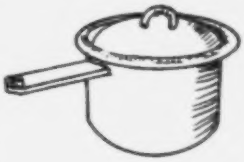
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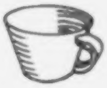
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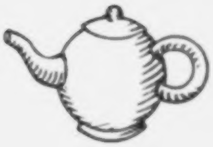
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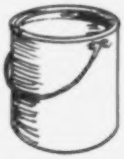
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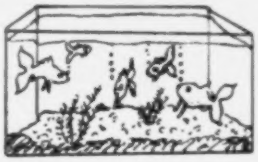
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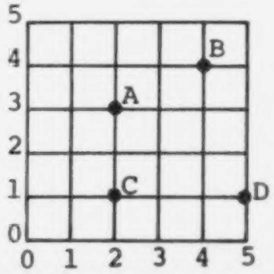
Do you remember?



Ordered Pairs

Point A is at (2 , 3).

Point B is at (,   ).

Point C is at (,   ).

Point D is at (,   ).

3.04.11 MULTIPLICATION THROUGH 3-DIGIT NUMBERS BY A 1-DIGIT MULTIPLIER WITH REGROUPING (EXCHANGE)

(3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.04.11.01B multiply a 2- or 3-digit number by a 1-digit number with regrouping (exchange) using the partial product method;

e.g.,

$$\begin{array}{rl} 243 & \\ \times\ \ 8 & \\ \cline{1-1} 24 & (8 \times 3) \\ 320 & (8 \times 40) \\ +1,600 & (8 \times 200) \\ \cline{1-1} 1,944 & \end{array}$$

3.04.11.02B multiply a 2- or 3-digit number by a 1-digit number with regrouping (exchange) using the short multiplication algorithm;

e.g.,

$$\begin{array}{r} 627 \\ \times\ \ 8 \\ \hline 5,016 \end{array}$$

3.04.11.03B solve word problems related to skills learned in this module.

e.g.,

> Two hundred sixteen pencils fit in one box. How many pencils will fit in 8 boxes?

VOCABULARY

TERMS

expanded notation
partial product

GETTING STARTED 1:

Write the following chart and examples on the chalkboard:

24	28	30	36	63	64	66	70	84	363	842
U	O	M	K	Y	W	N	R	T	A	H

21	14	12	12	33	28	32
x 3	x 2	x 2	x 3	x 2	x 1	x 2
63						
Y						

63	7	6	70	10	121	42	421
x 1	x4	x4	x 1	x 3	x 3	x 2	x 2

Ask the students to solve the examples and use the key to find the secret message. Write the corresponding letter under each example.

GETTING STARTED 2:

Prepare and display a word problem.

e.g.,

> A great runner is practicing for the Olympics. She ran 4 laps on a track. Each lap is 210 yards long. How far did she run?

Say, "What do we have to find? (We have to find the distance the runner ran.) What information do we have? (We know that she ran 4

GETTING STARTED 2: cont'd

laps and that each lap was 210 yards long.) How can we find the answer? (We can write an addition example or a multiplication example and solve them.) Which is faster, addition or multiplication?" (Multiplication is faster.) Ask a student to go to the chalkboard and write, solve, and label a multiplication number sentence for this problem.

e.g.,

```
   210 yards in each lap
 x   4 laps
   840 yards in all
```

Say, "What did we find? (We found that the runner ran a total of 840 yards.) How did we do the multiplication?" (First we multiplied the ones by 4, then we multiplied the tens by 4, and then we multiplied the hundreds by four.) When we multiplied 4 times 1 ten, we wrote 4 in the tens place in the product. What does this 4 really mean? (This 4 represents 4 tens or 40 which is the product of 4 times 1 ten.) When we multiplied 4 times 2 hundreds, we wrote 8 in the hundreds place in the product. What does this 8 really mean?" (This 8 represents 8 hundreds or 800 which is the product of 4 times 2 hundreds.)

3.04.11

3.04.11.01 **multiply a 2- or 3-digit number by a 1-digit number with regrouping (exchange) using the partial product method**

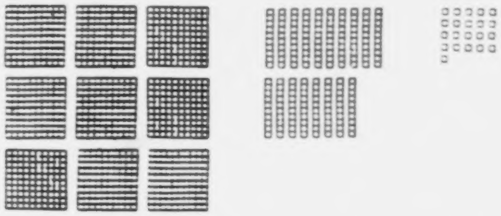
STRATEGY 1: Prepare and distribute squared material to each student or group of students. Write a multiplication example on the chalkboard.

e.g.,

$$\begin{array}{r} 367 \\ \underline{\times\ \ 3} \end{array}$$

Say, "How can we show 367 using squared material?" (We can display 3 hundred squares, 6 ten strips, and 7 one squares.) Ask the students to display the squared material on their desks. Say, "What does the example tell us to do? (We must multiply 367 by 3.) If we multiply our squared material by 3, how many ones would we have? ... tens? ... hundreds?" (We would have 21 ones ... 18 tens ... 9 hundreds.) Ask the students to display this on their desks.

e.g.,



Say, "How can we regroup the squared material so that there are no more than 9 in each place? (We can regroup 20 ones as 2 tens. This will leave 1 one. We now have a total of 20 tens. We can regroup 20 tens as 2 hundreds. This will leave zero tens. We now have a total of 11 hundreds.) Let's continue. How can 11 hundreds be regrouped?" (We can regroup 11 hundreds as 1 thousand and 1 hundred.) Ask the students to show the regroupings with their squared material as a student writes the product, 1,101, on the chalkboard. Say, "There is an easier way to multiply when we must regroup. We can find partial

STRATEGY 1:
cont'd

products and then add the partial products. Let's multiply in the ones place and find that partial product."

e.g.,

$$\begin{array}{rl} 367 & \\ \underline{\times\ \ 3} & \\ 21 & (3 \times 7) \end{array}$$

Repeat this procedure for multiplying the 6 tens and the 3 hundreds by 3. When all three partial products are written, say, "What must we do with our partial products in order to find our answer?" (We must add them. The sum of the partial products is the final product.) Ask a student to complete the example at the chalkboard.

e.g.,

$$\begin{array}{rl} 367 & \\ \underline{\times\ \ 3} & \\ 21 & (3 \times 7) \\ 180 & (3 \times 60) \\ \underline{+900} & (3 \times 300) \\ 1{,}101 & \end{array}$$

Repeat this procedure with other examples.

STRATEGY 2: Prepare and display a place value chart and a multiplication example on the chalkboard.

e.g.,

Hundreds	Tens	Ones
2	4	5
x		4

Say, "How do we read this example? (We read it as 4 times 245.) Where do we always begin multiplying? (We begin multiplying with the ones, then the tens, and then the hundreds.) When we multiply 4 times 5, what is the product? (The product is 20.) Since 20 is equal to 2 tens and 0 ones we write a 2 in the tens column and a 0 in the ones column." Complete

STRATEGY 2: cont'd

the example by repeating this procedure for 4 times 40 and 4 times 200. Ask a student to add the partial products to find the final product.

e.g.,

Hundreds	Tens	Ones	
2	4	5	
x		4	
	2	0	(4 x 5)
1	6	0	(4 x 40)
+ 8	0	0	(4 x 200)
9	8	0	

Say, "What is the product? (The product is 980.) Repeat this procedure with other examples.

3.04.11.02 **multiply a 2- or 3-digit number by a 1-digit number with regrouping (exchange) using the short multiplication algorithm**

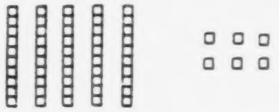
STRATEGY 1: Prepare and distribute squared material (hundreds, tens, ones) to each student or group of students. Write a multiplication example on the chalkboard and ask the students to write it into their notebooks.

e.g.,

$$\begin{array}{r} 56 \\ \underline{\times\ 3} \end{array}$$

Say, "What must we find in this example?" (We must find the product of 3 groups of 56.) Show 56 using your squared material."

e.g.,

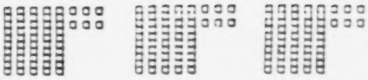


Say, "How can we complete this example using the squared material?" (We can show 3 groups of 5 tens and 6 ones.)

3.04.11

STRATEGY 1: cont'd

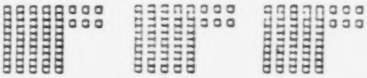
e.g.,



Say, "How many tens and ones are shown? (There are 15 tens and 18 ones.) Let's regroup the ones and tens so there are no more than 9 in each place." Ask the students to show the regrouping using their squared material.

e.g.,

15 tens and 18 ones



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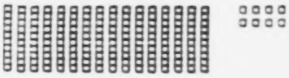
16 tens and 8 ones



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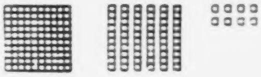
1 hundred, 6 tens and 8 ones



Say, "We can multiply 3 times 56 without using squared material. How can we do that? (We can begin by multiplying in the ones place and finding a partial product. We then find partial products for the tens and hundreds places. Then we find the sum of the partial products.) That is correct, but there is a short way to multiply when regrouping is necessary. When multiplying 3 times 6, we do not need to write 18 below the line. Since the 8 means 8 ones, we need only write the 8 below the line. The 1 ten is written just above the tens place and is added later."

e.g.,

$$\begin{array}{r} {\scriptstyle 1} \\ 56 \\ \underline{\times\ 3} \\ 8 \end{array}$$

STRATEGY 1: cont'd

Say, "Now we multiply 3 times 5 tens. What does 3 times 5 tens equal? (3 times 5 tens equals 15 tens or 150.) We can now add 15 tens to the 1 ten which was placed at the top of the column. How many tens do we have in all? (We now have 16 tens.) If we regroup 16 tens into tens and hundreds, what do we have? (We have 1 hundred and 6 tens.) Place the 6 tens in the tens column and the 1 hundred in the hundreds column."

e.g.,

$$\begin{array}{r} {}^{1} \\ 56 \\ \underline{\times\ 3} \\ 168 \end{array}$$

Ask the students to copy this into their notebooks. Repeat this procedure with other examples.

STRATEGY 2: Prepare a place value chart and a multiplication example.

e.g.,

Thousands	Hundreds	Tens	Ones
	2	7	8
x			5

Say, "To multiply 5 times 278 we will use a short method of multiplying. There is a difference between this short method and the partial product method. Now we will regroup ones for tens, tens for hundreds, and hundreds for thousands without showing partial products. How much is 5 times 8? (5 times 8 equals 40.) Since 40 equals 4 tens and 0 ones, we will write the 0 in the ones column and the 4 above the 7 in the tens column. When we multiply the tens we will add the 4 tens to that product." Demonstrate on the chalkboard.

3.04.11

STRATEGY 2: cont'd

e.g.,

Thousands	Hundreds	Tens	Ones
	3	4	
	2	7	8
x			5
		9	0

Say, "What does 5 times 7 equal?" (5 times 7 equals 35 tens. 35 tens + 4 tens equals 39 tens.) Where can we write 39 tens? (We can write the 9 in the tens column and the 3 in the hundreds column.) Explain." (Since 39 tens equals 390, the 9 equals 9 tens and the 3 equals 3 hundreds.)

e.g.,

Thousands	Hundreds	Tens	Ones
1	3	4	
	2	7	8
x			5
1,	3	9	0

Ask the students to copy this example into their notebooks. Continue this procedure until all the numbers have been multiplied.

Repeat this with other 2- and 3-digit multiplication examples which require regrouping.

3.04.11.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare and display a chart and a word problem.

e.g.,

Numbers of Items per Case	
Pencils	144
Diapers	132
Band-Aids	58
Shoe Polish	24
Aspirin	60
Pens	144

Ms. Coleman bought 7 cases of diapers. Use the chart to find the number of diapers Ms. Coleman bought.

STRATEGY 1: cont'd

Say, "What must we find? (We must find the number of diapers Ms. Coleman bought.) What information does the problem give us? (The problem tells us that she bought 7 cases of diapers.) Is that enough information to answer the question? Explain. (No, we must use the chart to find the number of diapers in each case.) How can we solve the problem?" (The chart tells us that there are 132 diapers in each case. Since Ms. Coleman bought 7 cases of diapers we should multiply 7 times 132.) Ask a student to solve the problem on the chalkboard while the other students write it in their notebooks. Accept either the partial product method or the regrouping method of multiplying.

e.g.,

```
  132
x   7                              2 1
-----                              132
   14    (7 x 2)                 x   7
  210    (7 x 30)                -----
+ 700    (7 x 100)                 924
-----
  924
```

Ask the students to create their own multiplication story problems based on the information on the chart.

STRATEGY 2: Prepare and display a word problem.

e.g.,

> In our school's annex, there are a total of 8 classes. Each class has 29 students. How many students are there in the annex?

Say, "What have we been asked to find? (We must find the number of students in the annex.) What information do we have? (The problem tells us the number of students in each class and the number of classes.) How can we solve this problem?" (We must multiply 29, the number of students in each class, by 8, the

STRATEGY 2: cont'd

the number of classes.) Ask a student to write the example on the chalkboard as the other students write it in their notebooks. Accept either the partial product method or the regrouping method.

e.g.,

$$\begin{array}{rl} 29 & \\ \underline{\times\ 8} & \\ 72 & (8 \times 9) \\ \underline{+160} & (8 \times 20) \\ 232 & \end{array} \qquad\qquad \begin{array}{r} 29 \\ \underline{\times\ 8} \\ 232 \end{array}$$

Repeat this procedure with other story problems.

e.g.,

- The students wanted to purchase materials to make scenery for their school play. They sold apples for 25¢ each during lunchtime. There were 165 apples sold each day for 8 days. How many apples were sold?

- Costumes were needed for 28 students. Each costume used 4 yards of material. How many yards of material were used for all the costumes?

P.O. 3.04.11.01&.03

NAME: ____________ CLASS: ________ DATE: ________

Complete the examples and solve the problems below.
Use the partial product method.

①
643
x 7
21 (7X 3)
280 (7X 40)
+4200 (7X600)
$\boxed{4{,}501}$

②
298
x 4
______ ( )
______ ( )
+______ ( )
$\boxed{}$

③
45
x 6
______ ( )
+______ ( )
$\boxed{}$

④
437
x 9
______ ( )
______ ( )
+______ ( )
$\boxed{}$

⑤
68
x 3
______ ( )
+______ ( )
$\boxed{}$

⑥
827
x 5
______ ( )
______ ( )
+______ ( )
$\boxed{}$

⑦ The Madison Avenue Newsstand received a delivery of 7 different magazines. There were 144 copies of each magazine. How many magazines were delivered?

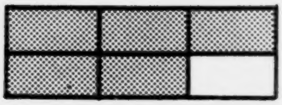
______ magazines were delivered.

⑧ The newsstand sells soft drinks in 5 different flavors. 225 cans of each flavor were delivered. How many cans were delivered?

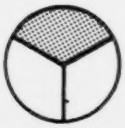
______ cans were delivered.

Do you remember?

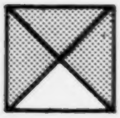
What fraction is represented by the shaded parts in each picture?



______



______



______

P.O. 3.04.11.02&.03

NAME: ______________________ CLASS: __________ DATE: ________

Complete the examples and solve the problems below.
Use the regrouping method.

①
$$\begin{array}{r} \overset{1}{6}\overset{1}{6}8 \\ \times\ \ 2 \\ \hline \boxed{1,336} \end{array}$$

②
$$\begin{array}{r} 63 \\ \times\ 9 \\ \hline \boxed{} \end{array}$$

③
$$\begin{array}{r} 235 \\ \times\ \ 8 \\ \hline \boxed{} \end{array}$$

④
$$\begin{array}{r} 368 \\ \times\ \ 6 \\ \hline \boxed{} \end{array}$$

⑤
$$\begin{array}{r} 97 \\ \times\ 5 \\ \hline \boxed{} \end{array}$$

⑥
$$\begin{array}{r} 184 \\ \times\ \ 7 \\ \hline \boxed{} \end{array}$$

⑦
$$\begin{array}{r} 419 \\ \times\ \ 3 \\ \hline \boxed{} \end{array}$$

⑧
$$\begin{array}{r} 537 \\ \times\ \ 6 \\ \hline \boxed{} \end{array}$$

⑨
$$\begin{array}{r} 85 \\ \times\ 4 \\ \hline \boxed{} \end{array}$$

⑩ The newspaper delivery truck delivers to 87 newsstands. Each newsstand receives 5 bundles of newspapers. How many bundles of newspapers does the truck have before its first delivery?

The truck has ________ bundles of newspapers before its first delivery.

⑪ Each of the 87 newsstands has 2 workers who work from 6:00 A.M. to 2:00 P.M.. During these 8 hours, how many people work at 87 newsstands?

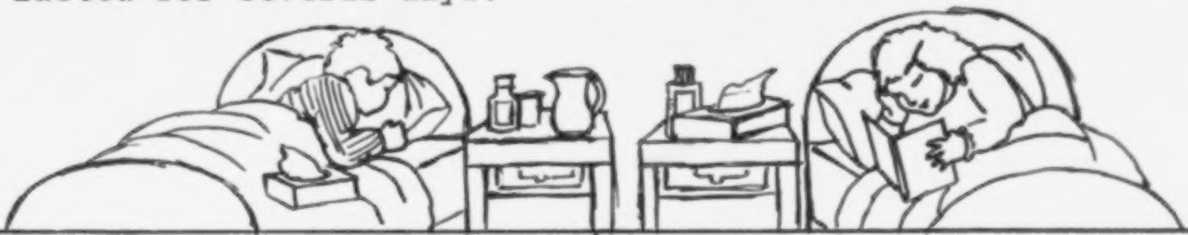
There are ________ workers in all.

P.O. 3.04.11.03

NAME: ______________________ CLASS: __________ DATE: ________

Solve the problems below.

Anne and Stephen Cohen both had colds. Their colds lasted for several days.



① Anne and Stephen used 4 boxes of tissues. There were 250 tissues in each box. How many tissues did they use in all?

They used ______ tissues in all.

② Anne took 25 milliliters of medicine each day for 7 days. How much medicine did Anne take in all?

She took ______ milliliters of medicine.

③ Stephen needed a lot of sleep. During the 7 days of his illness he slept 12 hours each day. How many hours did he sleep in 7 days?

He slept ______ hours in 7 days.

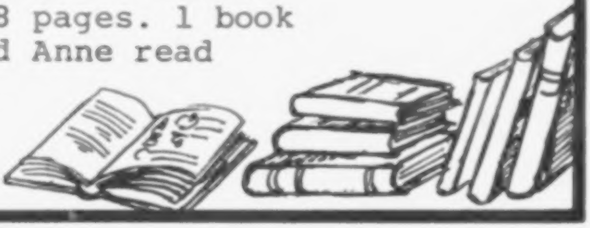
④ When they weren't sleeping, Anne and Stephen spent 45 minutes each day playing games. They did this for 5 days. For how many minutes during the 5 days did they play games?

They spent ______ minutes playing games.

CHALLENGE!

Anne read 4 books while she was sick. 2 books had 46 pages each. 1 book had 118 pages. 1 book had 167 pages. How many pages did Anne read in all?

Anne read ________ pages in all.



SHARPENING YOUR SKILLS

Units 68,69,70

Name:______ **Class:**______ **Date:**____

1. Write the Roman numeral next to the Arabic numeral.

13 XIII
15 ______
16 ______
14 ______

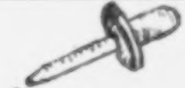
20 ______
19 ______
23 ______
25 ______

26 ______
24 ______
30 ______
29 ______

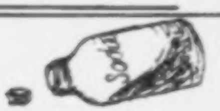
32 ______
35 ______
34 ______
39 ______

2. Brenda is reading a book which has XXXIV chapters. She just finished reading chapter XIX. How many more chapters must she read to complete the book? ______

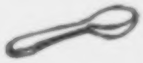
3. Circle the unit of measure that you would expect to find on each container.



liter
milliliter



liter
milliliter



liter
milliliter

4. This is a one liter container. How many milliliters can it hold?

ⓐ 10 milliliters
ⓑ 100 milliliters
ⓒ 1,000 milliliters

5. A pool is filled with 1,000 liters of water. How many kiloliters of water is that?

ⓓ 1 kiloliter
ⓔ 10 kiloliters
ⓕ 1,000 kiloliters

6.

67
x 3
____(3 x 7)
+____(3 x 60)
____
☐

8.

516
x 7
____

7.

463
x 8
____(8 x 3)
____(8 x 60)
+____(8 x 400)
____
☐

9. Our school received a delivery of 253 boxes of crayons. Each box has 8 crayons. How many crayons did we receive?

We received _____crayons.

3.05.07 DIVISION WITH REMAINDERS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.05.07.01B recognize a remainder as that which is "left over" in division;
e.g.,

$$\begin{array}{r} 3 \\ 6\overline{)19} \\ \underline{-18} \\ 1 \end{array} \text{ remainder} \qquad \begin{array}{r} 3 \text{ R1} \\ 6\overline{)19\phantom{\text{ R1}}} \\ \underline{-18}\phantom{\text{ R1}} \\ 1\phantom{\text{ R1}} \end{array}$$

3.05.07.02B solve word problems related to skills learned in this module.
e.g.,

Mary has 12 cookies to share equally among 5 friends. How many cookies will each friend receive? How many cookies will be left?

VOCABULARY

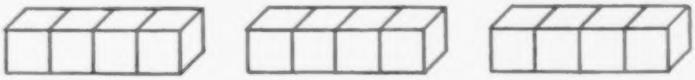
TERMS

dividend
divisor
quotient
remainder

GETTING STARTED 1:

Prepare and distribute a group of interlocking cubes to each student or group of students. Say, "Let's use these cubes to multiply and divide." On the chalkboard write: 3 x 4 = 12. Ask the students to use their cubes to show 3 x 4 = 12.

e.g.



Say, "How can we use this arrangement of interlocking cubes to help us write a division example?" (There are 12 cubes altogether. These 12 cubes are divided into 3 groups with 4 in each group. We can say 12 divided by 4 equals 3.) Ask a student to write this on the chalkboard as the other students write it in their notebooks.

e.g.,

$$\begin{array}{r} 3 \\ 4\overline{)12} \end{array} \qquad 12 \div 4 = 3$$

Say, "Twelve cubes divided into groups of 4 equals 3 groups." Elicit that multiplication and division are inverse operations and that multiplication can be used to check division. Repeat this procedure with other equal groups of cubes.

GETTING STARTED 2:

Prepare and display 3 cards, each with a different word relating to division, e.g., dividend divisor quotient

Prepare and display the following numeral cards:

24 8 3 6 4 12 2

GETTING STARTED 2: cont'd

On the chalkboard write the following:

$$\overline{)\quad} \qquad \underline{\qquad} \div \underline{\qquad} = \underline{\qquad}$$

Say, "We will create division examples." Hold up the card labeled divide. Say, "Look at the numeral cards. I will select a numeral card which will be the dividend. Which card should I pick?" (6) Ask a student to write 6 in the dividend in both examples.
e.g.,

$$\overline{)6} \qquad\qquad \boxed{6} \div \boxed{} = \boxed{}$$

Hold up the cards labeled 2 and 3. Ask a student to write these numerals in the appropriate places in the examples.
e.g.,

$$\begin{array}{r}3\\2\overline{)6}\end{array} \qquad\qquad \boxed{6} \div \boxed{2} = \boxed{3}$$

Ask a student to hold the cards labeled divisor and dividend next to the divisor and dividend in each example.
e.g.,

$$\boxed{\text{divisor}} \rightarrow \begin{array}{r}3\\2\overline{)6}\\ \uparrow\\ \boxed{\text{dividend}}\end{array} \qquad\qquad \underset{\underset{\boxed{\text{dividend}}}{\uparrow}}{\boxed{6}} \div \underset{\underset{\boxed{\text{divisor}}}{\uparrow}}{\boxed{2}} = \boxed{3}$$

Repeat this procedure with the other cards. Vary this activity by beginning with the quotient and asking the students to select a divisor and dividend, or by beginning with the divisor and asking the students to select a quotient and dividend.

3.05.07

3.05.07.01 **recognize a remainder as that which is "left over" in division**

STRATEGY 1: Prepare and distribute a group of interlocking cubes to each student or group of students. Say, "We have used these cubes to divide groups and to find quotients. Our groups have always divided evenly; that is there have been an equal number in each group with nothing left over. Place 17 cubes on your desk. See if you can divide the 17 cubes into 2 or more equal groups." After the students have experimented say, "What did you discover?" Accept all reasonable responses.

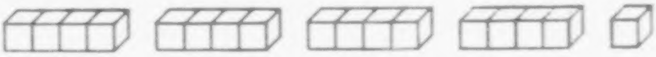
e.g.,

- I could make 2 groups of 6, but there was also 1 group of 5.
- I could make 3 groups of 5, but there was 1 group of 2 left over.
- I could make 4 groups of 4, but there was 1 extra cube.
- I made 1 group of 9 cubes and 1 group of 8 cubes.
- I could make 8 groups of 2, but 1 cube was left over.

Say, "These extra cubes, or the ones that were left over, have a special name when we divide a larger group into several smaller equal groups. It is called a remainder. Why do you think we call it a remainder? (After we divide, it is the amount that remains after equal groups have been formed.) Let's see how we can record remainders while working other examples with our interlocking cubes."

e.g.,

$$\begin{array}{r} 4\ \text{R1} \\ 4\overline{)17} \\ -16 \\ \hline 1 \end{array}$$



STRATEGY 1: cont'd

Say, "In example A we began with a group of 17. We divided 17 into 4 groups of 4 which equal 16. We subtracted 16 from 17. How many were left? (There was 1 left.) What do we call the cube that was left? (It is called the remainder.) Therefore, 17 divided by 4 equals 4 remainder 1. The remainder is always written as part of the quotient."

Say, "How can we check our work? (We can check our work by multiplying the quotient by the divisor.) How much is 4 times 4? (4 times 4 equals 16.) Since 16 is not equal to the dividend, 17, we must add the remainder, 1, to 16 which equals 17. Are we correct? Explain." (We are correct. The quotient times the divisor, plus the remainder, equals the dividend, 17.)

Repeat this procedure, using interlocking cubes, for the following examples:

$3\overline{)17}$ $6\overline{)17}$ $2\overline{)17}$

STRATEGY 2: Prepare and display several divison examples which will have remainders, e.g., $7\overline{)53}$. Say, "How do we read this example? (53 divided by 7.) What must we find? (We must find the quotient.) To find the quotient, we must think back to the multiplication and division number families. What is the closest multiple of 7 to 53 which is less than 53? (Since 7 times 7 equals 49 and 8 times 7 equals 56, 49 is the closest multiple to 53 which is less than 53.) Since 7 sevens equal 49, we will have something left over. The difference is the amount that is left over. This difference is called the remainder. It is the amount that remains after equal groups have been formed. Let's subtract 49 from 53 to see what is left over." Demonstrate.

e.g.,

$$\begin{array}{r} 7 \ \text{R4} \\ 7\overline{)53} \\ \underline{-49} \\ 4 \end{array}$$

STRATEGY 2: cont'd

Say, "The remainder, 4, is written next to the quotient. We used 7 sevens which equals 49. We subtracted 49 from 53 and got a difference of 4. This difference is that which is left over or the remainder."

Say, "To check our work, we multiply the quotient by the divisor and add the remainder." Demonstrate on the chalkboard.

e.g.,

$$\begin{array}{r} 7 \\ \underline{\times 7} \\ 49 \\ \underline{+\ 4} \\ 53 \end{array}$$

Say, "If we computed correctly the result should be our original dividend, 53."

Repeat this procedure with several other examples.

3.05.07.02 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare and distribute interlocking cubes as in Strategy 1, P.O. 3.05.07.01.

e.g.,

A. Twenty-five people are going to a party. 5 people can fit in each car. What is the least number of cars they could take?

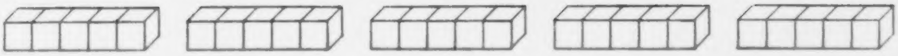
B. Twenty-six people are going to a party. 5 people can fit in each car. What is the least number of cars they could take?

Say, "Look at problem A. What must we find? (We must find the least number of cars 25 people could take to the party.) What information does the problem give us? (There are 25 people. No more than 5 people can fit in each car.) How can we solve this problem?" (We can use 25 interlocking cubes to represent the people. If we arrange the cubes in groups of 5, we will find the number of cars needed.)

3.05.07

STRATEGY 1: cont'd

e.g.,



Say, "How many cars were needed? (5 cars were needed.) Is there another way to solve the problem?" (If each car holds 5 people, we could divide 25 by 5.) Ask a student to write this example on the chalkboard as the other students write it in their notebooks.

e.g.,

$$5\overline{)25}^{\;5}$$

(In problem B there are 26 people going to the party while in problem A there are only 25 people going to the party.) How are the problems the same? (Only 5 people can fit in each car.) Let's use our cubes to model this problem."

e.g.,

Say, "How many groups of 5 are there? (There are 5 groups of 5.) What do these cubes represent? (The cubes represent people.) How many full cars will there be? Explain. (There will be 5 full cars because 5 people can fit in each car.) There seems to be 1 extra person. How can this person go to the party? (This person can go to the party if there is one more car.) Let's return to the problem. What must we find? (We must find the least number of cars needed to take 26 people to the party.) How many cars are needed?" (6 cars are needed.) Ask a student to write and solve the example on the chalkboard which represents this problem, as the other students write it in their notebooks.

STRATEGY 2: cont'd

e.g.,

$$\begin{array}{r} 5\ \text{R1} \\ 5\overline{)26} \\ -25 \\ \hline 1 \end{array}$$

Say, "It is important to read the problem carefully to understand what is given and what is being asked. In this example the quotient, with a remainder of 1, tells us several things. It tells us that 26 people were divided into groups of 5. What does the 1 tell us?" (The 1 tells us that another car is needed because there is 1 extra person who will not fit into the other cars.)

Repeat this procedure with other examples involving remainders.

Note: Extensions of this activity include determining the maximum number of people who could go to the party in 6 cars and determining the number of empty seats in the unfilled car.

P.O. 3.05.07.01-.02

NAME:______________________________ CLASS:__________ DATE:________

Follow the directions below.

Solve and check each example.

① $8\overline{)78}$	**check**	② $6\overline{)57}$	**check**
③ $2\overline{)17}$	**check**	④ $5\overline{)29}$	**check**

Solve each problem.

⑤ 13 children went to the movies. Each ticket admitted 2 children. How many tickets were needed?

______tickets were needed.

⑥ The theater sold gumballs in boxes of 40. If 6 children shared a box of gumballs, how many would each child get? How many would be left over?

Each child would get ______gumballs.

______would be left over.

⑦ There were 7 seats in each row. There were 59 people in the theater. How many rows could they fill? How many people would be in an unfilled row?

They could fill______ rows.

There would be _______ people in an unfilled row.

⑧ The film was 85 minutes long. It contained cartoons, each 9 minutes long, except the last one. How many 9-minute cartoons were there? How long was the last cartoon?

There were ______ 9-minute cartoons.

The last one was______ minutes long.

SHARPENING YOUR SKILLS

Units 70,71

Name:_________________________ **Class:**_______ **Date:**_______

Multiply. Use either the partial product method or the short method. Choose the correct answer.

1. 67×4	2. 428×6	3. 169×3	4. 288×2
ⓐ 248	ⓔ 1,248	ⓐ 4,827	ⓔ 576
ⓑ 268	ⓕ 2,428	ⓑ 507	ⓕ 510
ⓒ 2,428	ⓖ 2,568	ⓒ 307	ⓖ 5,616
ⓓ Not Here	ⓗ Not Here	ⓓ Not Here	ⓗ Not Here

5. Mrs. Kay took 34 students to the beach. She asked each of them to collect at least 8 scallop shells. What is the least number of shells they collected?

They collected at least _____ shells.

6. Sally's picture of the beach won first prize. 18 classmates each gave her scallop shells to decorate the picture frame. How many scallop shells did she use?

She used ____ scallop shells.

Divide.

7. $6\overline{)39}$

8. $7\overline{)65}$

9. $8\overline{)70}$

10. $5\overline{)43}$

11. 35 students from Mrs. Kay's class ate red snapper for lunch. Each snapper fed 4 people. How many snappers were needed?

____ snappers were needed.

12. 22 students collected starfish in buckets. 4 students shared each bucket. How many buckets were needed?

____ buckets were needed.

Unit 72

3.06.04 IMPROPER FRACTIONS AND MIXED NUMBERS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.06.04.01B define and identify an improper fraction;

e.g.,

$\frac{5}{4}$, $\frac{3}{3}$, and $\frac{4}{2}$ are improper fractions because they are greater than or equal to 1.

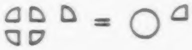
3.06.04.02B define and identify a mixed number;

e.g.,

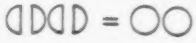
$7\frac{1}{2}$ is a mixed number because it is made up of a whole number and a fraction.

3.06.04.03B change an improper fraction to a mixed number or a whole number;

e.g.,

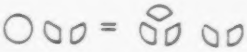
$\frac{5}{4} = 1\frac{1}{4}$ 

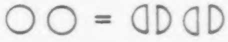
$\frac{3}{3} = 1$

$\frac{4}{2} = 2$ 

3.06.04.04B change a mixed number or a whole number to an improper fraction.

e.g.,

$1\frac{2}{3} = \frac{5}{3}$ 

$2 = \frac{4}{2}$ 

VOCABULARY

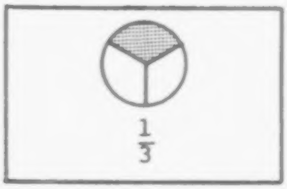
TERMS

whole number
numerator
denominator
mixed number
fraction
proper fraction
improper fraction

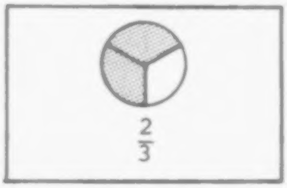
GETTING STARTED 1:

Prepare a set of flashcards. Each card should have a model of a fraction and its fractional name on each side of the card.

e.g.,



side 1



side 2

Say, "What is a fraction? (A fraction is part of a whole or part of a group.) Display side 1 of a fraction flashcard. Say, "Into how many equal parts is this circle divided? (This circle is divided into 3 equal parts.) What is the fractional part that is shaded in this figure?" (One-third is shaded.) Display side 2. Say, "Into how many equal parts is this circle divided? (This circle is divided into 3 equal parts.) What fractional part is shaded? (Two-thirds are shaded.) How are these circles the same? (They are both divided into 3 equal parts. Each part is called one-third.) How are they different? The first circle shows 1 part shaded, the second circle shows 2 parts shaded.) Which is greater, one-third or two-thirds?" (Two-thirds is greater.)

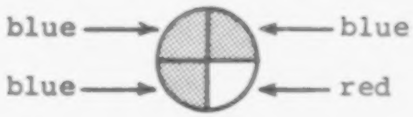
Repeat this procedure using other cards.

GETTING STARTED 2:

Prepare a flannel board and fractional parts. Display a fractional representation of four-fourths on the flannel board with three-fourths in one color and one-fourth in another color.

GETTING STARTED 2: cont'd

e.g.,



Say, "Into how many equal parts is this figure divided? (This figure is divided into 4 equal parts.) How many parts are 'blue'? (Three parts are blue.) How many parts are 'red'? (One part is red.) What fractional name can we give to the 'blue' parts? (The blue parts can be called three-fourths.) What fractional name can we give to the 'red' part?" (The red part can be called one-fourth.)

On the chalkboard write: $\frac{3}{4}$, $\frac{1}{4}$. Say, "In the fraction, $\frac{3}{4}$, what is the special name for the three? (The special name for the three is the numerator.) What is the special name for the four?" (The special name for the four is the denominator.) Repeat this procedure for one-fourth.

Say, "In the fractions, three-fourths and one-fourth, which are larger, the numerators or the denominators? (The denominators are larger.) What do the denominators tell us? (The denominators tell us the number of equal parts into which the whole has been divided.) What do the numerators tell us? (The numerators tell us how many of these equal parts we are describing.) What can we say about 2 fractions which have the same denominators but different numerators, such as $\frac{1}{4}$ and $\frac{3}{4}$?" (Both fractions may represent an object or group divided into 4 equal parts. $\frac{1}{4}$ represents 1 of those equal parts. $\frac{3}{4}$ represents 3 of those equal parts.)

Repeat this procedure with other flannel fractional parts.

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3.06.04.01 **define and identify an improper fraction**

STRATEGY 1: Prepare a flannel board and fractional parts. Display 2 circles, each divided into fourths. e.g.,

Say, "Five boys went to John's Pizza Palace for lunch. John cuts his special pizzas into four equal pieces. What can we call each piece?" (Each piece can be called one-fourth.) On the chalkboard write: $\frac{1}{4}$. Say, "What can we call two pieces?" (Two pieces can be called two-fourths.) On the chalkboard write: $\frac{2}{4}$. Repeat this procedure for three-fourths and four-fourths. Say, "How are one-fourth, two-fourths, and three-fourths the same? (They all have a 4 as the denominator and the numerators are less than the denominators.) How is four-fourths the same as these? (Four-fourths has the same denominator, 4.) How is it different? (The numerator is not smaller than the denominator; it is equal to the denominator.) A fraction with a denominator and a numerator which are equal, is called an improper fraction. Four-fourths is an improper fraction. What does the fraction, four-fourths, tell us?" (Four-fourths tells us 1 whole pizza has been cut into 4 equal pieces and we are talking about all 4 pieces.)

Say, "The 5 boys ordered 2 pizzas, each cut into 4 equal parts. Each boy ate only 1 slice." Ask a student to separate the 5 "slices" from the 2 "pizzas" on the flannel board. Say, "Let's see if we can write a fraction which represents the number of pieces the boys ate. What do we call the two numbers in a fraction? (The two numbers are called the numerator and the denominator.) The denominator represents the number into which the whole was divided. What number will we write in the denominator? (Since each pizza has 4 equal parts,

STRATEGY 1: cont'd

the denominator will be 4.) The numerator represents the number of pieces about which we are talking. What number will we write in the numerator?" (Since the boys ate 5 pieces, the numerator will be 5.) On the chalkboard write: $\frac{5}{4}$.

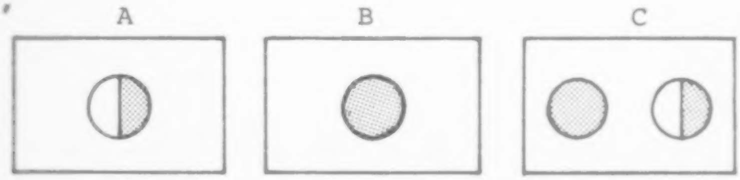
Say, "What is the same about five-fourths and the other fractions? (Five-fourths also has a 4 as the denominator.) What is different? (Five-fourths has a numerator which is greater than the denominator.) When the numerator is equal to or greater than the denominator, the fraction is called an improper fraction. An improper fraction can represent 1 whole or more than 1 whole." On the chalkboard write the above definition of an improper fraction. Ask the students to write it into their notebooks.

On the chalkboard write several fractions, e.g., $\frac{1}{4}$, $\frac{5}{3}$, $\frac{7}{8}$, $\frac{5}{6}$, $\frac{3}{3}$, $\frac{6}{4}$. Ask the students to use fractional parts to represent these fractions, identify the improper fractions, circle them on the chalkboard, and explain why they are called improper fractions.

3.06.05.02 **define and identify a mixed number**

STRATEGY 1: Display pictures which illustrate fractions, whole numbers, and mixed numbers.

e.g.,



Say, "Look at picture A. How much of the circle is shaded? (One-half of the circle is shaded.) Look at picture B. How much of the circle is shaded? (The whole circle is shaded.) Yes, one whole circle is shaded." Ask a student to write the fractions and the whole numbers beneath A and B which represent

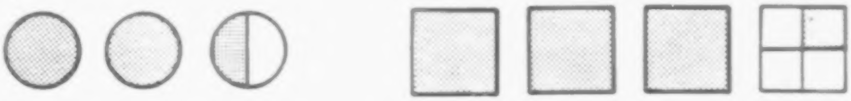
3.06.04

STRATEGY 1: cont'd

these pictures, e.g., $\frac{1}{2}$ and 1. Say, "How many circles are shown in picture C? (Two circles are shown in picture C.) How many circles are shaded? (One whole circle is shaded and one-half of the other circle is shaded.) What can we call one whole and one-half?" (One whole and one-half can be called one-and-one-half.) Beneath picture C write: $1\frac{1}{2}$. Say, "When the whole number, 1, is combined with the fraction, $\frac{1}{2}$, it is called a mixed number."

On the chalkboard, draw several simple illustrations of mixed numbers.

e.g.,



Ask 2 students to label each illustration with a mixed number, e.g., $2\frac{1}{2}$, $3\frac{1}{4}$. Ask the students to copy the illustrations and the mixed numbers into their notebooks.

Note: Improper fractions should be compared with mixed numbers. The students should conclude that improper fractions and mixed numbers are 2 different ways to numerically represent the same amounts.

3.06.05.03 **change an improper fraction to a mixed number or a whole number**

STRATEGY 1: Prepare a flannel board and flannel fractional parts. Display 3 halves.

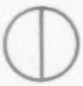
e.g.,

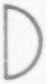
Ask a student to identify these fractional parts, e.g., Each part is one-half of a circle. Ask another student to write a fraction which represents these

750

STRATEGY 1: cont'd

fractional parts, e.g., $\frac{3}{2}$. Say, "What kind of fraction is $\frac{3}{2}$? Explain." ($\frac{3}{2}$ is an improper fraction. The numerator is greater than the denominator. The fraction represents more than 1 whole.) Ask a student to place two halves together. e.g.,





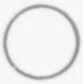
Say, "What is another name we can give to three-halves? Explain." (Since two-halves equal one whole, another name for three-halves is one and one-half.) On the chalkboard write: $\frac{3}{2} = 1\frac{1}{2}$.

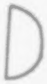
Repeat this procedure for improper fractions having the same numerators and denominators, e.g., $\frac{2}{2}$, $\frac{3}{3}$, $\frac{4}{4}$, $\frac{5}{5}$, $\frac{6}{6}$, and for improper fractions having denominators which will divide evenly into the numerators, e.g., $\frac{4}{2}$, $\frac{6}{3}$, $\frac{8}{2}$, $\frac{9}{3}$, $\frac{16}{4}$.

3.06.04.04 **change a mixed number or a whole number to an improper fraction**

STRATEGY 1: Say, "Mrs. Smith had $1\frac{1}{2}$ oranges in the refrigerator." Ask a student to write the number $1\frac{1}{2}$ on the chalkboard. Say, "What kind of a number is $1\frac{1}{2}$? (It is a mixed number.) Why?" (It is made up of a whole number and a fraction.) Ask another student to come to the chalkboard and draw a diagram to represent $1\frac{1}{2}$ oranges.

e.g.,





Say, "If Mrs. Smith decided to give each of her three children $\frac{1}{2}$ of an orange, what did Mrs. Smith have to do?" (She had to divide the whole orange into 2 equal parts.) Ask a student to divide the whole into 2 equal parts. Say, "Can each of the three children

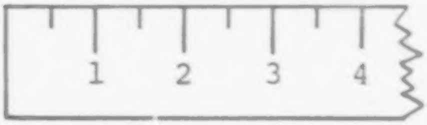
STRATEGY 1: cont'd

now have $\frac{1}{2}$ of an orange? (Yes) Why? (There are now 3 pieces; enough pieces for each of her three children.) How many halves are there in all?" (There are 3 halves in all.) Demonstrate as you count each half. Write $\frac{3}{2}$ on the chalkboard and say, "Mrs. Smith had $1\frac{1}{2}$ oranges. She divided the whole orange into 2 equal parts so that each of her three children would get $\frac{1}{2}$ of an orange. There are now $\frac{3}{2}$ in all. What kind of a fraction is $\frac{3}{2}$? (It is an improper fraction.) Why? (The numerator is greater than the denominator.) Is $1\frac{1}{2}$ the same as $\frac{3}{2}$? Explain. (They are the same. We changed a mixed number, $1\frac{1}{2}$, to an improper fraction, $\frac{3}{2}$, and still had the same amount.) The whole was equal to $\frac{2}{2}$. When we added the $\frac{2}{2}$ plus the number of halves left over, $\frac{1}{2}$, we had $\frac{3}{2}$ in all."

Repeat this procedure to change other mixed numbers or whole numbers to improper fractions, e.g., $1\frac{3}{4} = \frac{7}{4}$, $3 = \frac{6}{2}$.

STRATEGY 2: Prepare a number line divided into whole numbers and halves or a demonstration ruler with half-inch markings.

e.g.,



Ask a student to point to the 1-inch mark on the ruler. Say, "This ruler shows two different size lines. What do the long lines mean? (The long lines are the inch lines. The numbers below the inch lines tell the number of inches from the left end of the ruler.) What do the short lines mean?" (The short lines are the half-inch lines.) Ask a student to point to the line which indicates one-half inch.

STRATEGY 2: cont'd

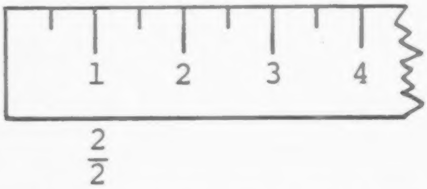
Say, "How many half inches are in one whole inch?"(There are 2 half inches in 1 whole inch.) On the chalkboard write:

1 whole inch = 2 half inches

$$1 = \frac{2}{2}$$

Say, "What kind of fraction is two-halves? Explain." (Two-halves is an improper fraction because the numerator and the denominator are equal.) On the chalkboard draw a facsimile of the ruler and write $\frac{2}{2}$ below the 1.

e.g.,



Ask a student to point to the line which designates $1\frac{1}{2}$ inches. Say, "From the left end of this ruler to the line for $1\frac{1}{2}$ inches, how many $\frac{1}{2}$ inches are there? (There are 3 half inches.) On the chalkboard write:

1 and $\frac{1}{2}$ inches = 3 half inches

$$1\frac{1}{2} = \frac{3}{2}$$

Say, "What kind of fraction is three-halves? Explain." (Three-halves is an improper fraction because the numerator is larger than the denominator.) On the facsimile of the ruler, write $\frac{3}{2}$ below the marking for $1\frac{1}{2}$.

Repeat this procedure for changing mixed or whole numbers to improper fractions through $12 = \frac{24}{2}$.

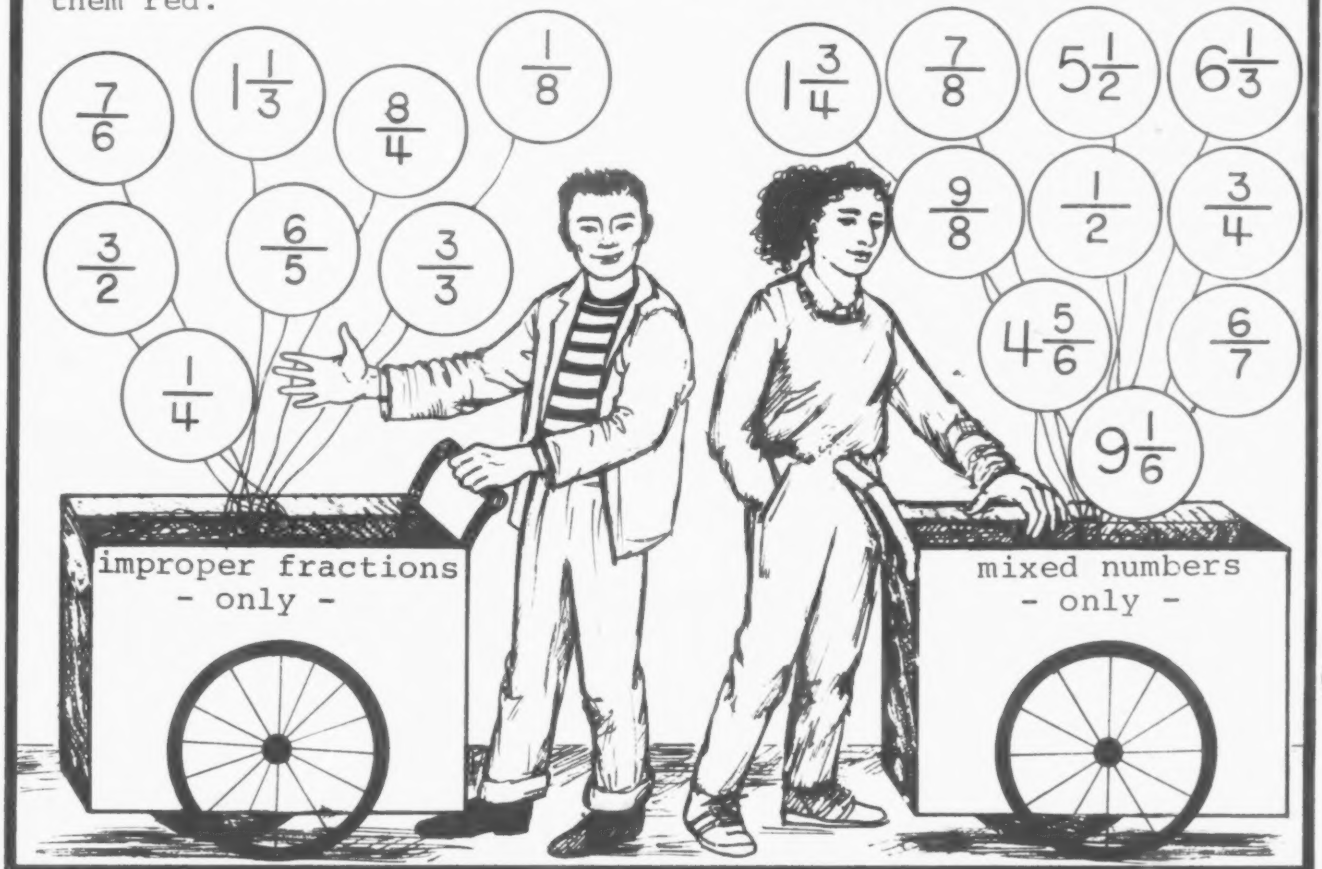
Say, "A ruler or a number line helps us to easily change many mixed numbers or whole numbers to improper fractions."

P.O. 3.06.04.01&.02

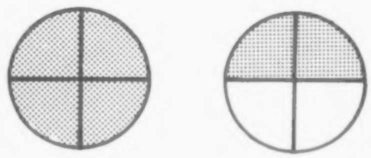
NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

"Pop" the balloons which do not belong in the wagons by coloring them red.

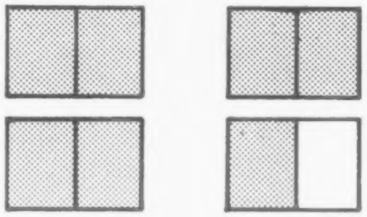

$\frac{7}{6}$
$1\frac{1}{3}$
$\frac{8}{4}$
$\frac{1}{8}$
$\frac{3}{2}$
$\frac{6}{5}$
$\frac{3}{3}$
$\frac{1}{4}$
$1\frac{3}{4}$
$\frac{7}{8}$
$5\frac{1}{2}$
$6\frac{1}{3}$
$\frac{9}{8}$
$\frac{1}{2}$
$\frac{3}{4}$
$4\frac{5}{6}$
$\frac{6}{7}$
$9\frac{1}{6}$
improper fractions - only -
mixed numbers - only -

Write an improper fraction and a mixed number for each group.



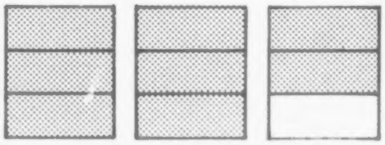
improper fraction ☐

mixed number ☐



improper fraction ☐

mixed number ☐



improper fraction ☐

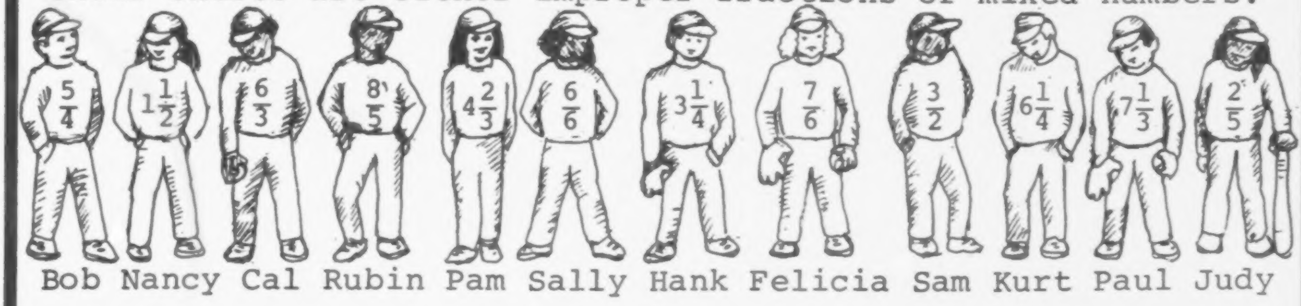
mixed number ☐

P.O. 3.06.04.01&.02

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

This Little League team got new team shirts. The numbers on their shirts are either improper fractions or mixed numbers.


$\frac{5}{4}$
$1\frac{1}{2}$
$\frac{6}{3}$
$\frac{8}{5}$
$4\frac{2}{3}$
$\frac{6}{6}$
$3\frac{1}{4}$
$\frac{7}{6}$
$\frac{3}{2}$
$6\frac{1}{4}$
$7\frac{1}{3}$
$\frac{2}{5}$
Bob
Nancy
Cal
Rubin
Pam
Sally
Hank
Felicia
Sam
Kurt
Paul
Judy

The names of the team members who have shirts with improper fractions are:

____

The names of the team members who have shirts with mixed numbers are:

____

Use the words in the word box to complete the sentences.

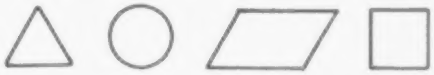
greater	fraction	numerator
less	whole	denominator

The __________ of an improper fraction is greater than or equal to the __________.

A mixed number has a __________ number and a fraction.

The numerator of a proper fraction is __________ than the denominator.

Do you remember?



The circle is third from the right.

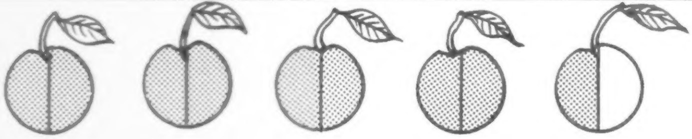
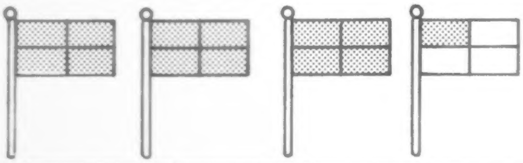
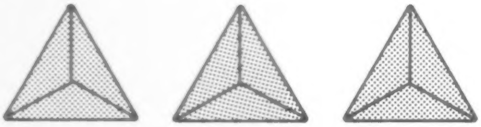
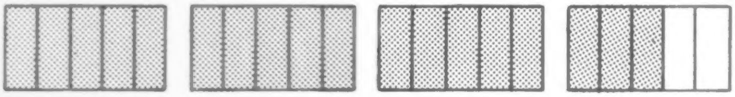
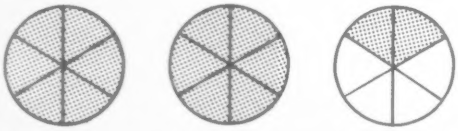
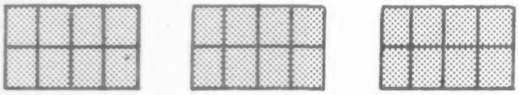
The parallelogram is __________ from the right.

The square is __________ from the left.

P.O. 3.06.04.03

NAME: ______________________ CLASS: __________ DATE: ________

Write the improper fraction represented by each drawing. Change the improper fraction to a mixed or a whole number.

	improper fraction	mixed or whole number
1. 	$\frac{9}{2}$	$4\frac{1}{2}$
2. 		
3. 		
4. 		
5. 		
6. 		

Do you remember?

solve check

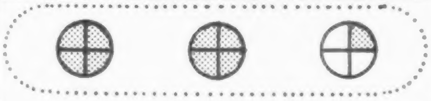
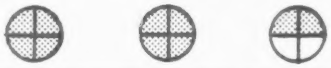
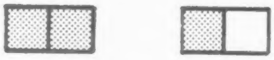
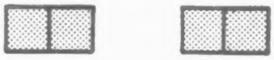
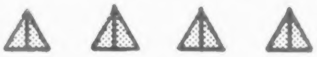
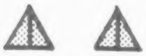
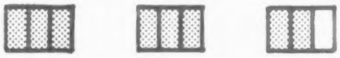
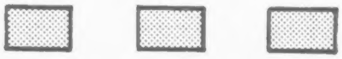
In the morning an ant traveled 2,070 mm. In the afternoon the ant slowed down and traveled 1,065 mm. How much farther did the ant travel in the morning?

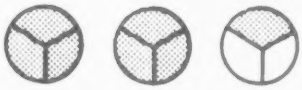
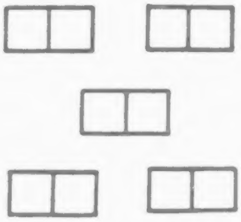
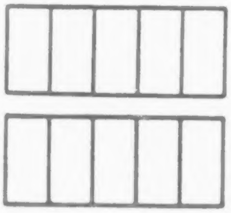
______________ mm

P.O. 3.06.04.04

NAME: ______________________ CLASS: __________ DATE: __________

Follow the directions below.

Circle the picture which illustrates each mixed number or whole number. Write an improper fraction for each circled picture.		
1. $2\frac{1}{4}$	 or 	improper fraction $\frac{9}{4}$
2. $1\frac{1}{2}$	 or 	
3. 4	 or 	
4. $2\frac{2}{3}$	 or 	

Fill in all or part of each drawing to illustrate the mixed or whole number. Write the improper fraction for each.		
Ⓐ $2\frac{1}{3}$  $2\frac{1}{3} = \boxed{\frac{7}{3}}$	Ⓑ 5  $5 = \boxed{}$	Ⓒ $1\frac{3}{5}$  $1\frac{3}{5} = \boxed{}$

Unit 73

3.06.05 RATIO

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.06.05.01B write a ratio to represent a relationship between two quantities;

e.g.,

2 ears to 1 bunny is read '2 to 1' and may be written $\frac{2}{1}$.

The number of ears to the number of bunnies is 2 to 1.

3.06.05.02B solve word problems related to skills learned in this module.

e.g.,

Mary baked 42 cookies for 6 friends. How many cookies will 1 friend get?

3.06.05

VOCABULARY

TERMS

ratio
fraction

GETTING STARTED 1:

Draw two ladders on the chalkboard with at least 10 steps on each ladder. Label the ladders A and B. Prepare flashcards with division facts through 81 ÷ 9 =   . Each flashcard should be written in a different division format.

e.g.,

$6\overline{)54}$, $54 \div 6 = \square$ $\frac{54}{6}$

Divide the students into Team A and Team B and say, "Today we will play Divide and Conquer. A student will display a division flash card. Each time a member of his/her team gives the correct quotient I will shade a step on the ladder. The first team to reach the top will have conquered their division facts and won the game. Be sure to say the entire division fact aloud." Demonstrate by displaying a flashcard and saying the fact aloud.

Play the game until one team has reached the top of the ladder.

Say, "What did we have to do in this game? (We had to divide.) In how many different ways did we see the division facts? (We saw them written in 3 different ways.) When we see the facts written differently, do they mean different things?" (No, they mean the same thing.)

GETTING STARTED 2:

Display a circle and a triangle.

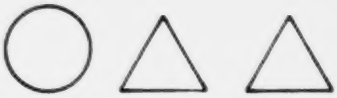
e.g.,

Say, "How many shapes do you see? (There are 2 shapes.) How many of the shapes are circles? (One of the shapes is a circle.) What fraction of the shapes are circles?" (One-half of the shapes is

GETTING STARTED 2: cont'd

a circle.) On the chalkboard write: $\frac{1}{2}$ of the shapes is a circle. Say, "Are there more circles or more triangles?" (There is an equal number of circles and triangles.) Display another triangle so that 2 triangles and 1 circle are displayed.

e.g.,



Say, "How many figures are there? (There are 3 figures.) What fractional part of the group does each shape represent? (Each figure represents one-third of the group.) What fractional part of the group do the triangles represent? (The triangles represent two-thirds of the group.) In the fraction, two-thirds, what does the numerator, 2, represent? (The numerator, 2, represents the 2 triangles.) What does the denominator, 3, represent?" (The demonimator, 3, represents the total number of shapes.)

Repeat this procedure to reinforce identifying and writing a fraction for part of a group. Use groups of 2, 3, 4, and 8 objects to reinforce halves, thirds, fourths, and eighths.

3.06.05

3.06.05.01 **write a ratio to represent a relationship between two quantities**

STRATEGY 1: Prepare two sets of number cards, each set numbered 1 through 12. Ask 2 boys and 1 girl to stand in front of the room. Ask a student to select and display a card which represents the number of boys who are standing. Ask another student to select and display a card which represents the number of girls who are standing. Say, "We can say that these numbers represent the ratio of boys to girls. A ratio is a way of comparing amounts. The 2 and the 1 help us compare the boys to the girls. We can write this ratio in two ways." Demonstrate on the chalkboard. e.g.,

2 to 1 or $\frac{2}{1}$

Ask two more girls to come to the front of the room. Ask a student to display number cards which represent the students who are now in the front of the room. Say, "How many boys are there? (There are 2 boys.) How many girls are there? (There are 3 girls.) What is the ratio of boys to girls?" (The ratio of boys to girls is 2 to 3.) Ask a student to write this ratio on the chalkboard while the other students write it in their notebooks.
e.g.,

2 to 3 or $\frac{2}{3}$

Say, "We must always be sure to write the numbers in the correct order, the order in which the relationship is expressed."

Repeat this procedure several times, changing the numbers and the order in which the ratio is expressed, e.g., boys to girls, girls to boys.

STRATEGY 2: Prepare and display a magnetic board (flannel board) and red and blue magnetic (flannel-backed) shapes. Place 3 red shapes and 5 blue shapes on the board. Say, "How many red shapes are there? (There are 3 red shapes.) How many blue shapes are there? (There are 5 blue shapes.) We can compare the number of red shapes to the number of blue shapes by using a ratio. A ratio compares the amount of one thing to the amount of another. The ratio of red shapes to blue shapes is 3 to 5. What do you think the ratio of blue shapes to red shapes is? (The ratio of blue shapes to red shapes is 5 to 3.) Always remember to give the ratio in the order in which it is asked."

Add 2 red shapes and 2 blue shapes to the board. Say, "Look at the board now. How many red shapes are there? (There are 5 red shapes.) How many blue shapes are there? (There are 7 blue shapes.) Listen carefully to my question. What is the ratio of blue shapes to red shapes? (The ratio of blue shapes to red shapes is 7 to 5.) What is the ratio of red shapes to blue shapes? (The ratio of red shapes to blue shapes is 5 to 7.) Another way we have of showing these ratios is by writing a fraction." Write these relationships in fraction form on the chalkboard.
Ask the students to write this in their notebooks.

e.g., $5 \text{ to } 7 = \frac{5}{7}$

$7 \text{ to } 5 = \frac{7}{5}$

$3 \text{ to } 5 = \frac{3}{5}$

$5 \text{ to } 3 = \frac{5}{3}$

Say, "Which number always represents the numerator of the fraction? (The first number of the ratio represents the numerator.) What does the second number represent?" (The second number of the ratio represents the denominator.)

Repeat this procedure by asking the students to express different ratios in both formats.

3.06.05

3.06.05.02 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare and display a word problem.
e.g.,

> Gary Carter hits one home run every fifteen times he is up at bat. What is the ratio of the number of home runs to the number of times at bat?

Say, "What are we asked to find? (We are asked to find the ratio of Gary Carter's home runs to the number of times he is at bat.) What information do we know? (We know that he hits one home run every fifteen times he is up at bat.) What numbers do you think we will use in preparing our ratio? (We will use the numbers 1 and 15.) According to the question, which number should come first? (The question asked for the number of home runs, 1, to the number of times at bat, 15.) What is the ratio of home runs to times at bat?" (The ratio of home runs to times at bat is 1 to 15.) Ask a student to write the ratio on the chalkboard in two different ways, as the other students write it in their notebooks.
e.g.,

1 to 15 or $\frac{1}{15}$

Say, "What is the ratio of times at bat to home runs? (That ratio is 15 to 1.) Why did the order of the numbers change?" (The order changed because the question changed.) Ask a student to write the ratio of times at bat to home runs on the chalkboard.
e.g.,

15 to 1 or $\frac{15}{1}$

Repeat this procedure with similar word problems.

STRATEGY 2: Prepare and display a word problem e.g.,

Jason spent 25¢ for 5 pencils.
What would one pencil have cost?

Say, "What are we being asked to find? (We must find the cost of one pencil.) What information does the problem give us? (The problem tells us the cost of 5 pencils, 25¢.) What is the ratio of the amount of money spent to the number of pencils bought?" (The ratio is 25 to 5.) Ask a student to write this ratio on the chalkboard in fraction form.
e.g.,

$$\frac{25}{5}$$

Say, "When have we seen fractions written like this before? (We have seen fractions written like this when we learned about improper fractions.) How would we read this as a division example?" (We would read this as 25 divided by 5.) Ask a student to solve this division example on the chalkboard.
e.g.,

$$\frac{25}{5} = 5$$

Say, "What does the quotient, 5, tell us?" (It tells us that each pencil would have cost 5 cents.) How did we solve the problem?" (We wrote a ratio of the cost of the pencils to the number of pencils. Then we divided.)

Repeat this procedure with other word problems. Reinforce the relationship between ratio and division.

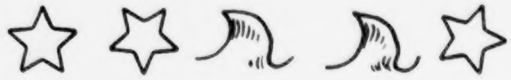
P.O. 3.06.05.01.

NAME:______________________ CLASS:__________ DATE:________

Follow the directions below.

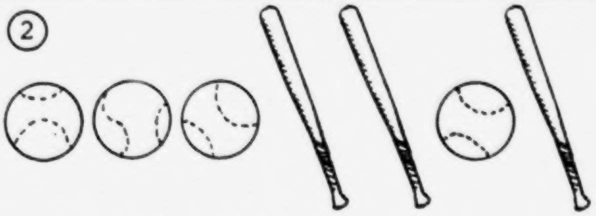
Write a ratio for each picture.

①



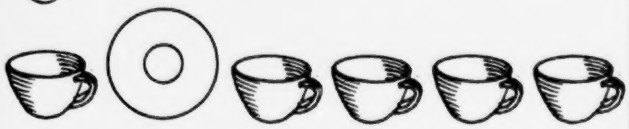
The ratio of stars to waves is 3 to 2.

②



The ratio of bats to baseballs is _____ to _____.

③



The ratio of cups to saucers is _____ to _____.

④

2 S M L 6 R B 3 D P

The ratio of letters to numbers is _____ to _____.

Write a fraction to name each ratio.

⑤ 7 Mets to 4 Yankees

The ratio of Mets to Yankees = $\frac{7}{4}$.

⑥ 9 dogs to 10 cats

The ratio of dogs to cats = ______

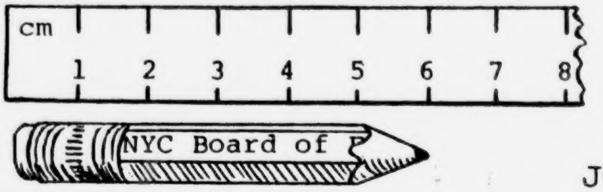
⑦ 4 chairs to 1 table

The ratio of chairs to tables = ______

⑧ 8 wheels to 2 cars

The ratio of wheels to cars = ______

Do you remember?



This ruler measures centimeters. How many millimeters long is Joe's pencil?

Joe's pencil is ______mm long.

P.O. 3.06.05.02

NAME: ______________________ CLASS: __________ DATE: ________

Solve the problems below.

① There were 30 children expected at the picnic. 24 of them attended. What is the ratio of children who attended to the number of children expected?

The ratio is _____ to _____.

② The ratio of boys to girls at the school picnic was $\frac{11}{13}$. How many children attended the picnic in all?

________ students attended the picnic.

③ It was a chilly day for a picnic. All the children wore sweaters. Eight wore red sweaters. Six wore white sweaters. What fraction shows the ratio of red sweaters to white sweaters?

____

④ Twenty-four students shared 6 containers of juice. What is the ratio of students to containers of juice?

____

How many students shared each container of juice?

____

CHALLENGE!

Attendance	
Boys	14
Girls	11
Room 101	

Attendance	
Boys	6
Girls	13
Room 102	

Attendance	
Boys	10
Girls	10
Room 103	

These charts show the attendance for each of three third-grade classes. What is the ratio of boys to girls who attended school in the third grade?

The ratio of boys to girls is __________.

Use the information on these charts to write your own story problems.

Unit 74

3.10.10 MEASUREMENT - SPEED

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.10.10.01C	identify uniform speed as rate; e.g., A car travels 40 miles per hour. Rate = 40 miles per hour
3.10.10.02C	identify time as the number of hours traveled; e.g., time = 8 hours traveled
3.10.10.03C	solve word problems related to skills learned in this module. e.g., Bill traveled 50 miles per hour for 3 hours. How far did Bill travel?

VOCABULARY

TERMS	SYMBOLS
rate of speed	
time	
distance	
miles per hour	mph
speed limit	

GETTING STARTED 1:

Prepare a box of chips and place it at one end of the classroom. Place an empty box at the other end of the classroom. Say, "The object of this game is to place as many chips in the empty box as you can in 1 minute. When I say 'go', a student will walk to the box of chips, pick up one chip, return to the starting point, and place the chip in the empty box. He/she will have 1 minute to repeat this activity as many times as possible." When 1 minute has elapsed, ask a student to count the number of chips that have been placed in the empty box and record this number on the chalkboard. Repeat this procedure with another student, allowing him/her to run to and from the box of chips. Say, "How do the two numbers compare? (The second number is greater?) Why?" Accept all reasonable answers and allow for discussion.

Repeat this procedure with other students.

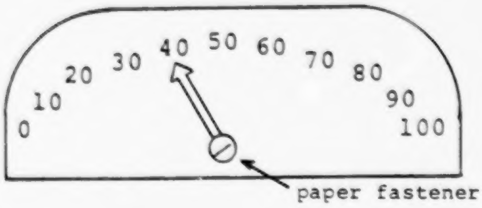
GETTING STARTED 2:

Prepare and display a three-minute egg timer and a clock with a second hand. Demonstrate how the egg timer is used. Ask the students to estimate the amount of time it will take for the sand to empty out of the top and fill the bottom container of the egg timer. Say, "How can we know for sure how long it takes?" (We can use a clock or watch to measure the time.) Demonstrate. Say, "Egg timers and clocks are both used to measure time. Which one is more useful? Explain." (A clock is more useful because it measures seconds, minutes, and hours.)

3.10.10

3.10.10.01 **identify uniform speed as rate**

STRATEGY 1: Prepare an oaktag demonstration speedometer and several road signs indicating speed limits. e.g.,



Speed Limit
50
mph

Speed Limit
60
mph

Road Work
Speed Limit
20
mph

People Working
Speed Limit
10
mph

Point to the speedometer and say, "Where have you seen one of these before? (We have seen one of these on the dashboard of a card.) What does it measure? (It measures the speed of the car.) It is called a speedometer. When we measure the speed of a car and the time it takes to move from one place to another, we call it rate of speed." Point the arrow to 50 on the speedometer. Say, "This speedometer shows the rate of speed as 50 miles per hour." On the chalkboard write: rate = 50 miles per hour. Say, "This means that at that speed, it will take 1 hour for this car to travel 50 miles."

Point to the road signs. Ask several students to read them. Say, "What are these signs used for?" (The signs tell the drivers how fast they may go.) Hold up the sign which reads 50 mph. Say, "mph means miles per hour. If we see this sign on the road, what does it tell us? (It tells us we may travel 50 miles per hour, but no faster.) What may happen if we travel faster? (We may get a speeding ticket or have an accident.) What will happen if we travel slower?" (It will take us longer to get where we want to go, but we probably won't get a speeding

STRATEGY 1: cont'd

ticket.) Hold up the sign which says, 'People working, speed limit 10 mph.' Say, "What is the rate of speed shown on this sign?" (The rate of speed shown is 10 miles per hour.) Ask a student to point the arrow to 10 mph on the speedometer. Say, "Is this fast or slow? Explain. (It is slow. It means it will take 1 hour to travel 10 miles if we obey the sign.) Why do you think the sign is telling us to go slowly?" (There are people working. If we move too fast, it may be dangerous.)

Repeat this procedure using the other signs.

Summarize by writing the following on the chalkboard as the students write it in their notebooks:

mph	miles per hour
speed limit	the fastest speed allowed
rate	speed of the car

3.10.10.02 **identify time as the number of hours traveled**

STRATEGY 1: Prepare and display 2 clocks and a trip chart. Say, "Class 3-208 went on a class trip once each month, from September through June. Here is a chart of the places they visited."
e.g.,

Trips Taken by Class 3-208

Month	Place	Time Left	Time Arrived	Time Traveled
Sept.	N.Y. Aquarium	10:00 A.M.	11:00 A.M.	1 hour
Oct.	Brooklyn Museum			
Nov.	Bronx Zoo			
Dec.	Library			

STRATEGY 1:
cont'd

Say, "Where did the class go in September? The class went to the New York Aquarium.) What time did they leave the school?" (They left at 10:00 A.M.) Ask a student to show 10:00 A.M. on one of the clocks. Say, "When did they arrive at the N.Y. Aquarium?" (They arrived at 11:00 A.M.) Ask another student to show 11:00 A.M. on the other clock. Say, "How much time did it take to go from their school to the aquarium?" (It took 1 hour.)

Repeat this procedure for the other class trips listed on the chart. Announce the time the class left and the time they arrived. Ask the students to write the times of departure and arrival on the chart and then to indicate the number of hours traveled. Ask them to explain how they determined the number of hours of traveling time.

3.10.10.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following story on the chalkboard:

> Yesterday Ben's father drove his truck from New York City to Washington, D. C. Ben wanted to learn more about his father's trip.

Say, "What questions about time, rate, and speed should he ask his father about his travels? List all appropriate responses on the chalkboard.
e.g.,

- At what rate of speed did you travel?
- What was the speed limit?
- How many miles per hour did you travel?
- How long did the trip take?
- At what time did you leave New York?
- What time did you arrive in Washington?
- What is the distance from New York to Washington, D.C.?

3.10.10

STRATEGY 1: cont'd

Say, "Let's pretend that Ben's father answered these questions. Here is one of his answers: He left New York at 10:00 A.M. and arrived in Washington, D.C. at 3:30 P.M. How much time did he spend traveling? (He spent $5\frac{1}{2}$ hours traveling.) How did you get that answer?" Accept all appropriate responses. e.g.,

- I used a clock. I moved the hands and counted the number of times the hands went completely around the clock, beginning at 10:00 and ending at 3:00. I then added $\frac{1}{2}$ hour to get to 3:30.
- I know there are 2 hours from 10:00 A.M. to 12:00 noon. I know there are $3\frac{1}{2}$ hours from 12:00 noon to 3:30 P.M. 2 hours plus $3\frac{1}{2}$ hours equal $5\frac{1}{2}$ hours.

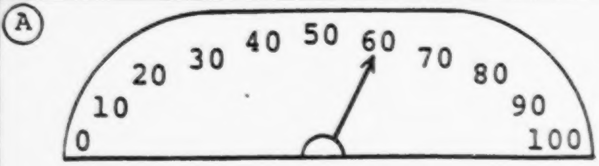
Repeat this procedure using other questions and possible responses to create problem solving situations.

P.O. 3.10.10.01-.03

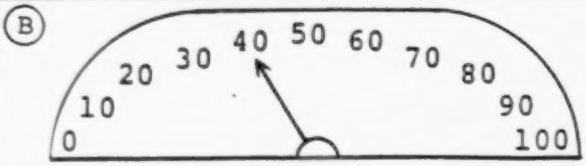
NAME: ____________________ CLASS: __________ DATE: ________

Follow the directions below.

What is the rate of speed shown on each speedometer?


A
0
10
20
30
40
50
60
70
80
90
100

Rate = 60mph


B
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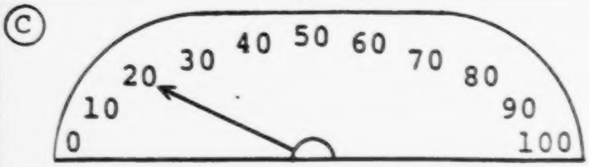
70
80
90
100

Rate = ________


C
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10
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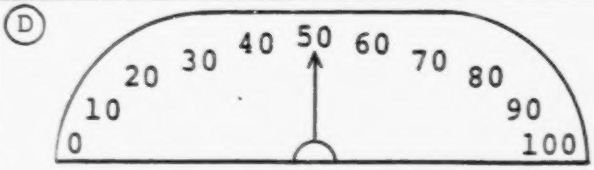
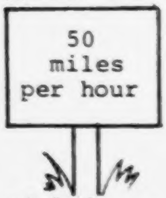
30
40
50
60
70
80
90
100

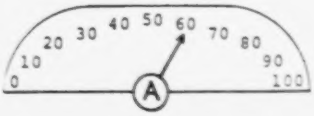
Rate = ________


D
0
10
20
30
40
50
60
70
80
90
100

Rate = ________

Look at the speed limit sign. Answer the questions.


50
miles
per hour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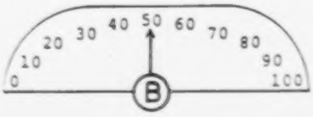
A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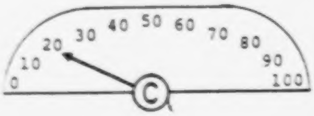
90
100
B

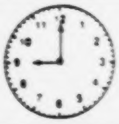
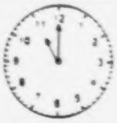

0
10
20
30
40
50
60
70
80
90
100
C

Which car is traveling faster than the speed limit? ______

Which car is traveling slower than the speed limit? ______

Which car is traveling 50 miles per hour? _____

Complete the table.

Bus Number	Leaves	Arrives	Number of Hours Traveled
1			2
2	7:00	11:00	
3	4:00 P.M.	7:00 P.M.	
4	11:00 A.M.	5:00 P.M.	

SHARPENING YOUR SKILLS

Units 73, 74

Name:________________________ **Class:**_______ **Date:**_______

1. Henry used 20 pennies to buy 4 pretzels.

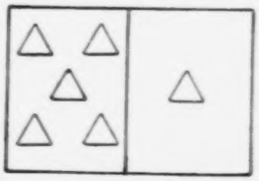
The ratio of pennies to pretzels is

______ to ______.

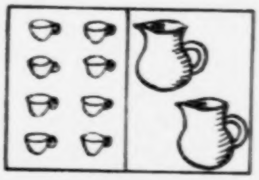
Write the ratio as a fraction. ______

What is the cost of 1 pretzel?_______

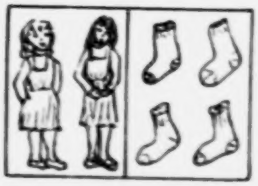
2. Write a ratio, in 2 ways, for each picture below.



___ to ___ $\frac{\square}{\square}$

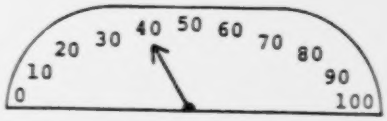


___ to ___ $\frac{\square}{\square}$

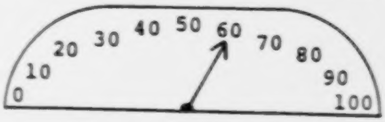


___ to ___ $\frac{\square}{\square}$

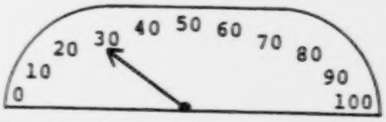
3. What is the rate of speed shown on each speedometer?


0
10
20
30
40
50
60
70
80
90
100

_____ mph

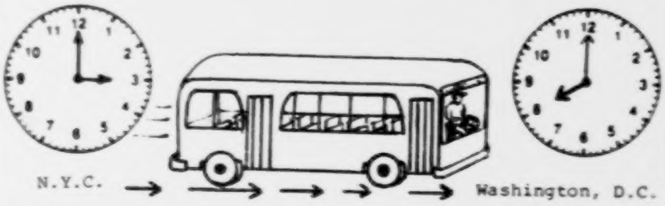

0
10
20
30
40
50
60
70
80
90
100

_____ mph


0
10
20
30
40
50
60
70
80
90
100

_____ mph

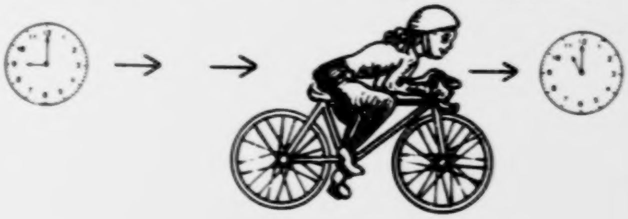
4. Keith's father drove a bus from New York City to Washington, D.C.


N.Y.C.
Washington, D.C.

For how many hours did he travel?

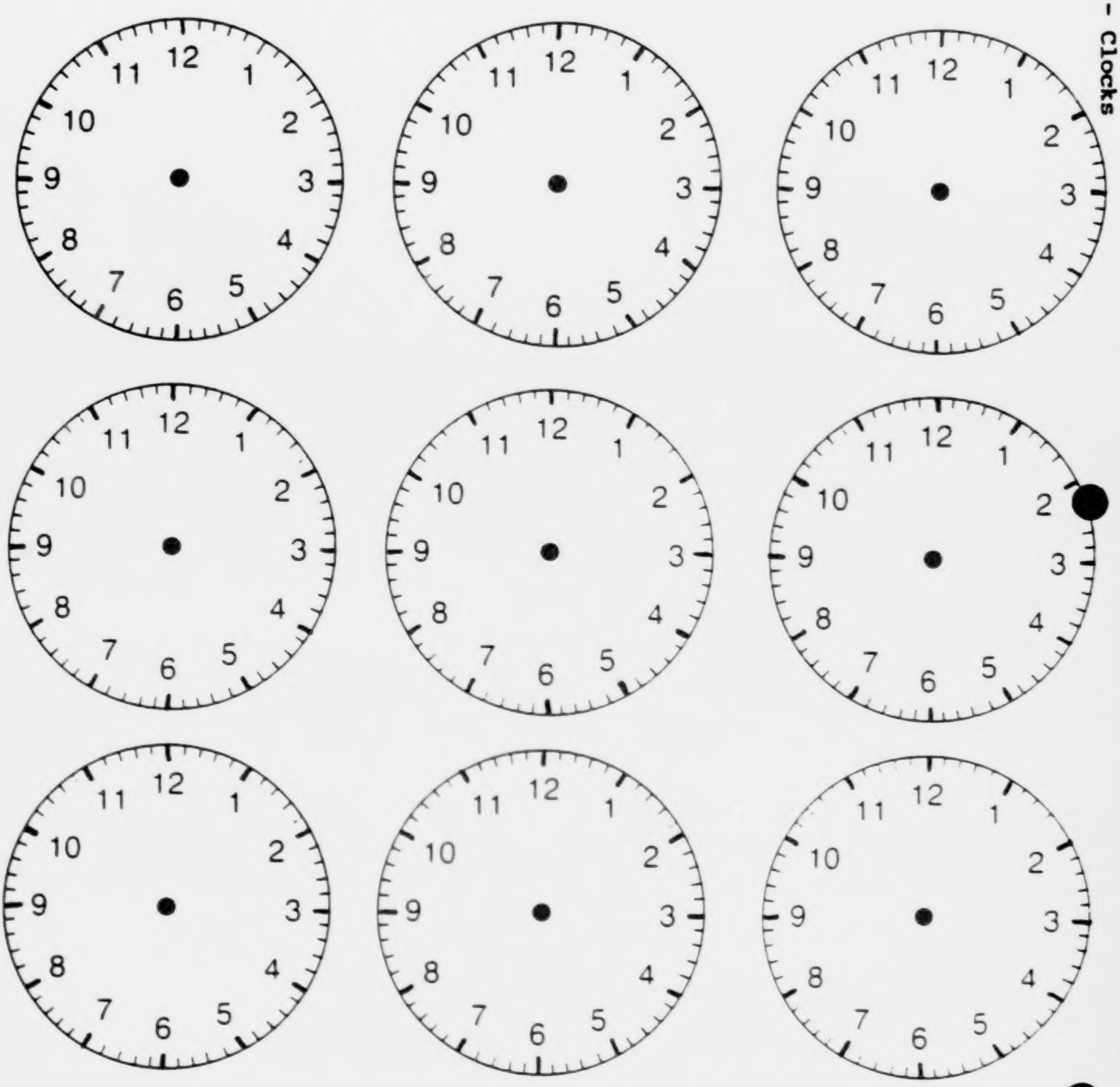
__________ hours

5. If you ride your bicycle at a speed of 15 miles an hour for 2 hours, how far will you travel?



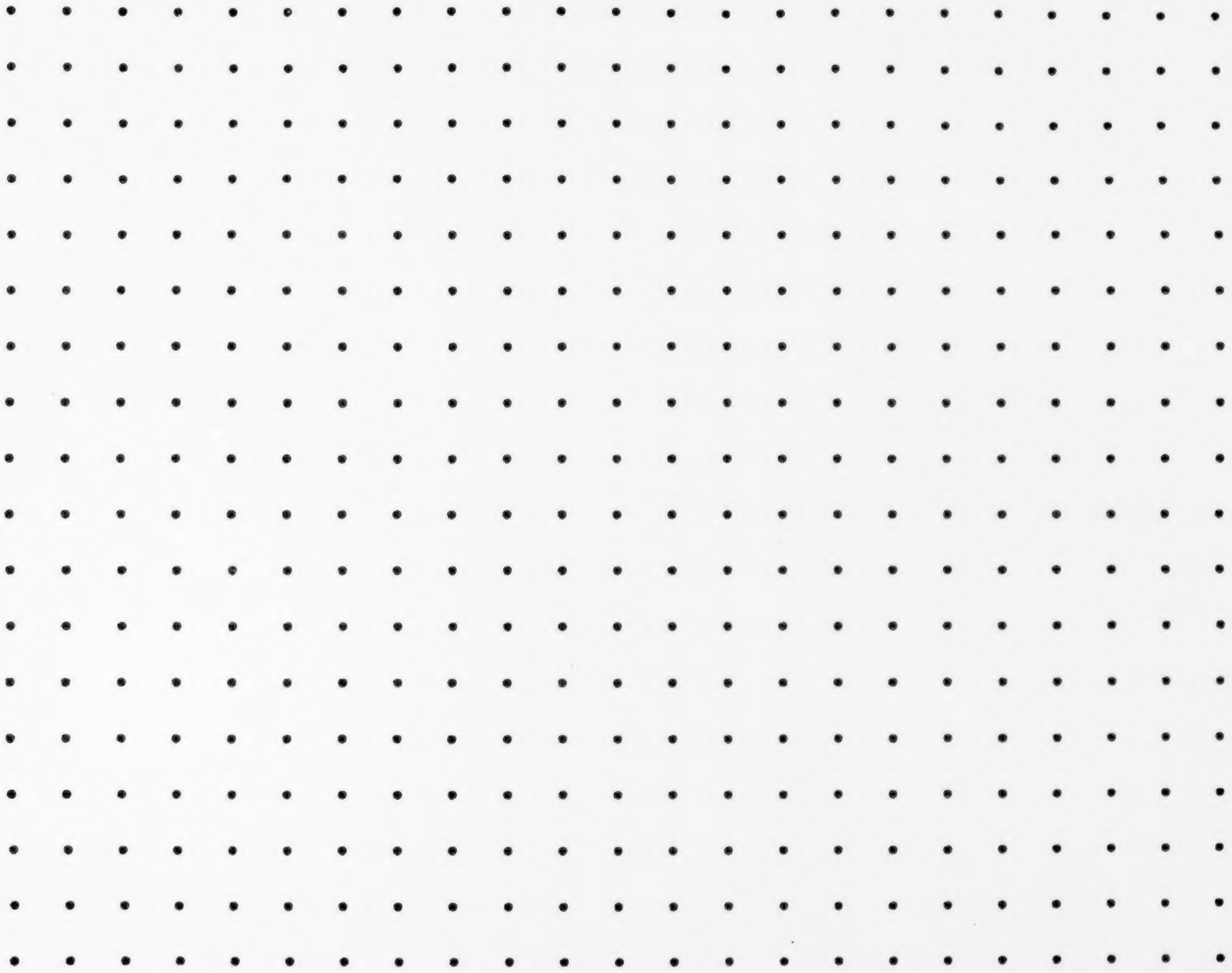
__________ miles

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

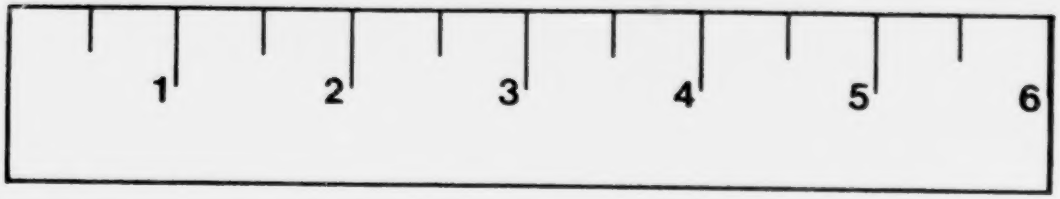


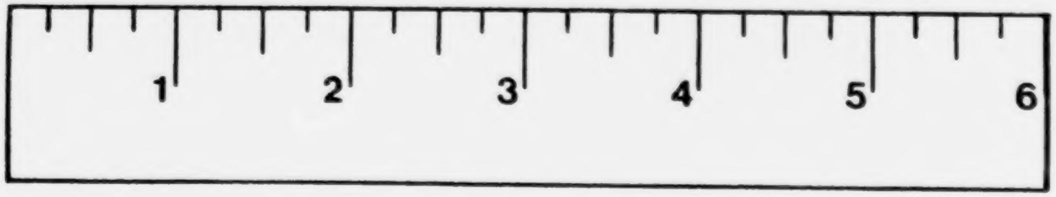
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

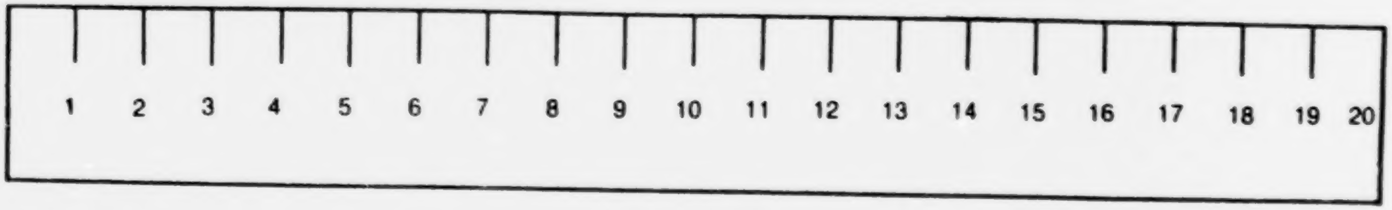
RESOURCE MATERIAL - Dot Paper (1) Geometry



RESOURCE MATERIAL - Dot Paper (2) Geometry






1
2
3
4
5
6
7
8
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12
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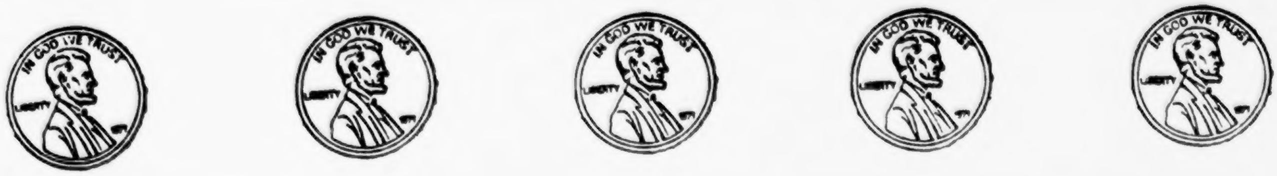
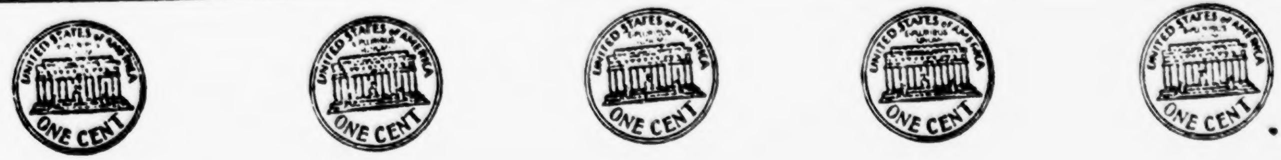
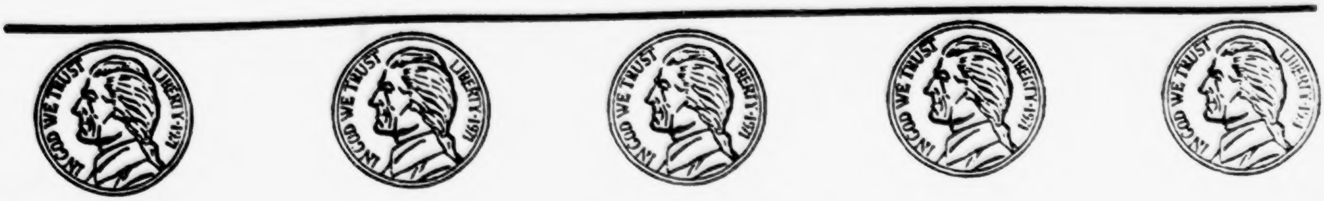
16
17
18
19
20

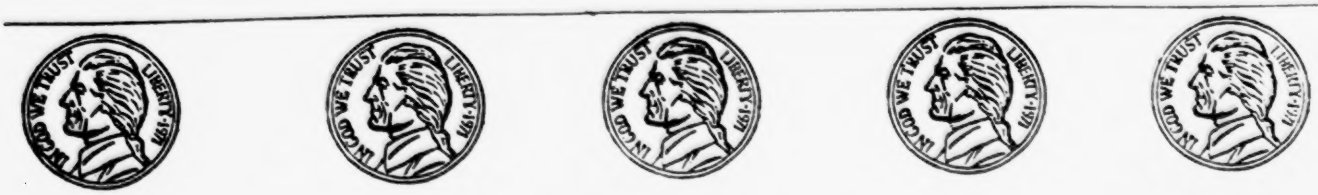
RESOURCE MATERIAL - Rulers

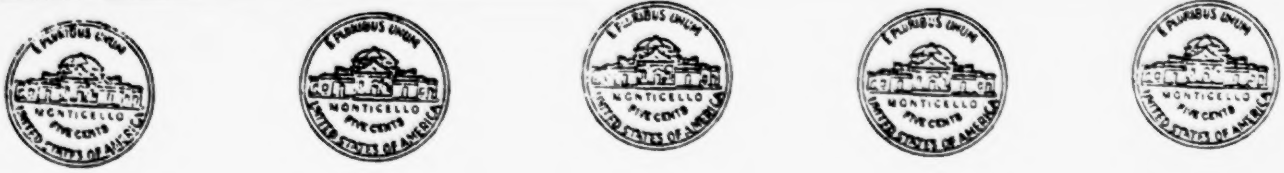
RESOURCE MATERIAL - Money (1)

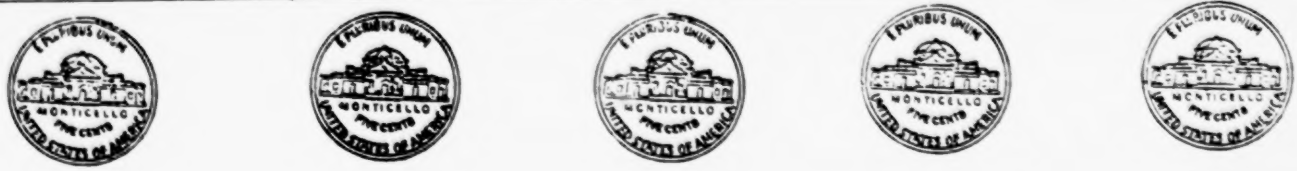

IN GOD WE TRUST
LIBERTY
1971

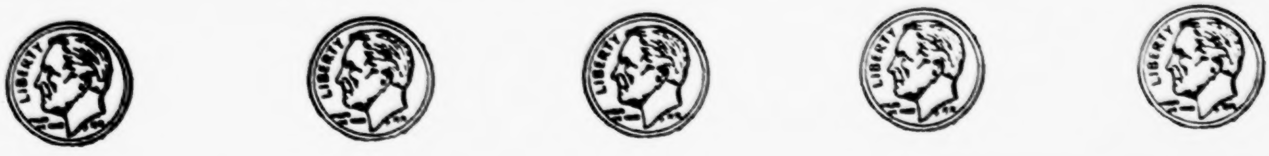

UNITED STATES of AMERICA
ONE CENT

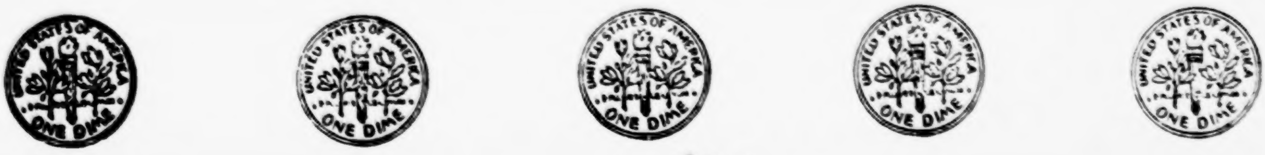

IN GOD WE TRUST
LIBERTY 1971

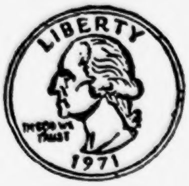

IN GOD WE TRUST
LIBERTY 1971

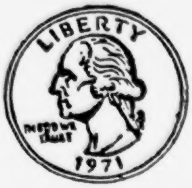

E PLURIBUS UNUM
MONTICELLO
FIVE CENTS
UNITED STATES OF AMERICA

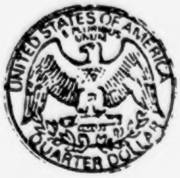

E PLURIBUS UNUM
MONTICELLO
FIVE CENTS
UNITED STATES OF AMERICA

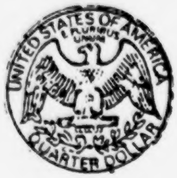


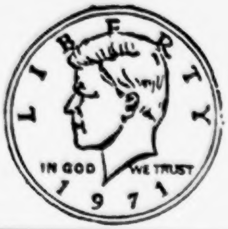

UNITED STATES OF AMERICA
ONE DIME

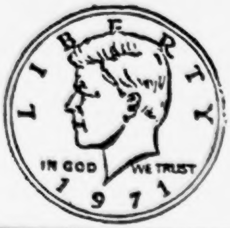

LIBERTY
IN GOD WE TRUST
1971

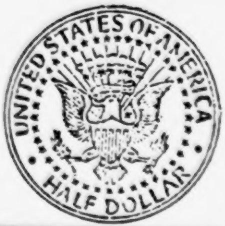

LIBERTY
IN GOD WE TRUST
1971

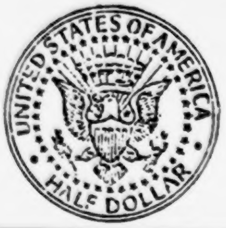

UNITED STATES OF AMERICA
E PLURIBUS UNUM
QUARTER DOLLAR

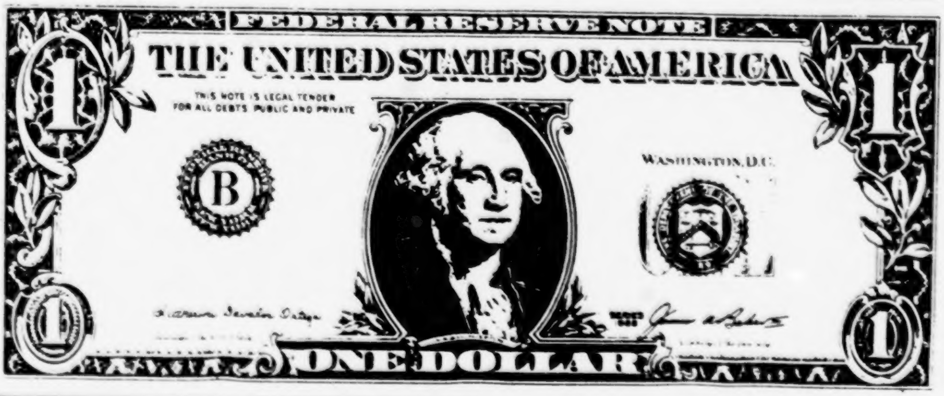

UNITED STATES OF AMERICA
E PLURIBUS UNUM
QUARTER DOLLAR

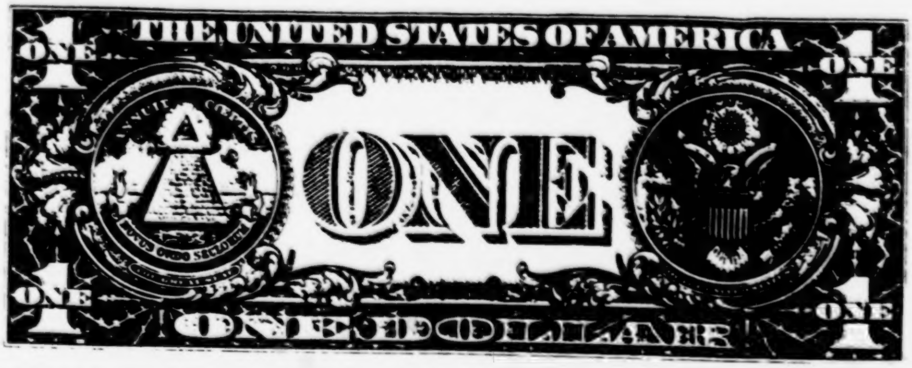

LIBERTY
IN GOD WE TRUST
1971

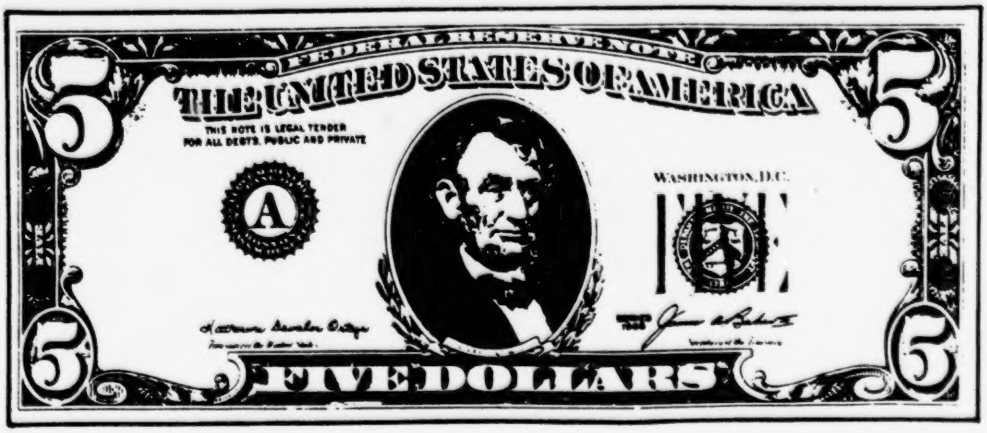

LIBERTY
IN GOD WE TRUST
1971

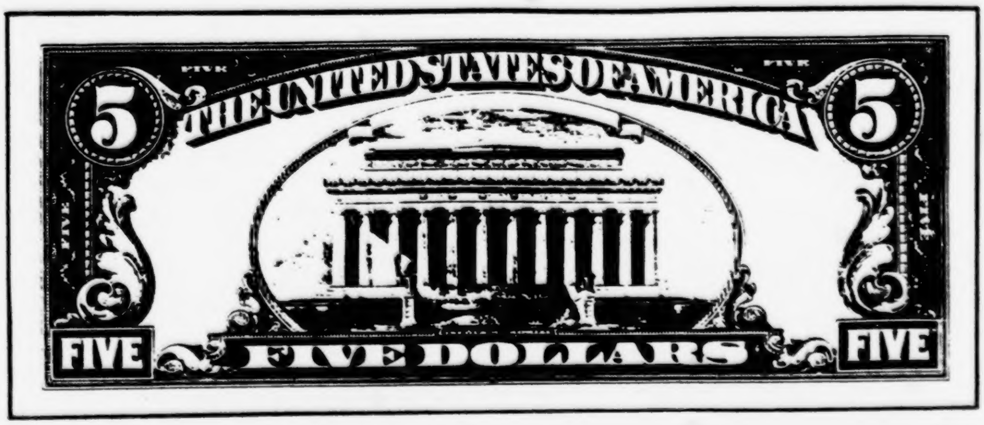

UNITED STATES OF AMERICA
HALF DOLLAR

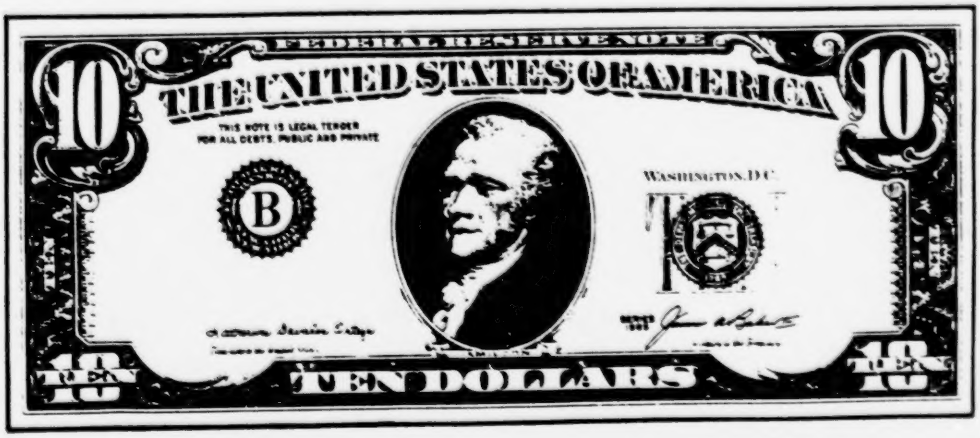

UNITED STATES OF AMERICA
HALF DOLLAR

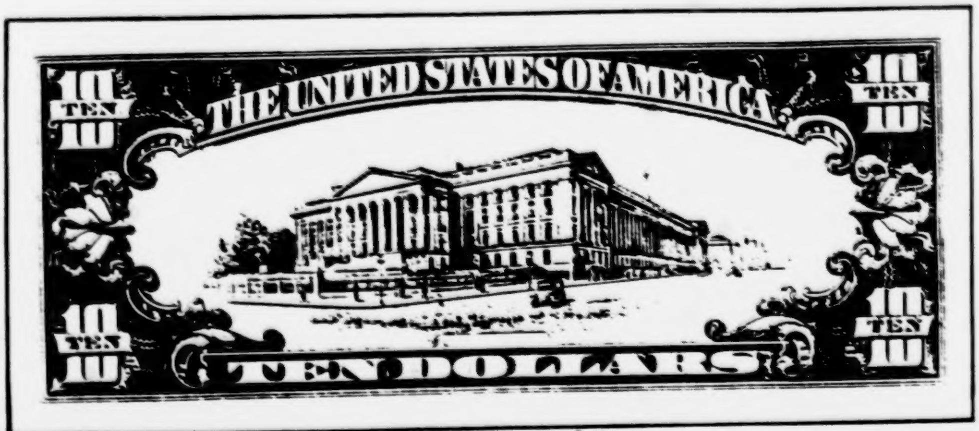

FEDERAL RESERVE NOTE
THE UNITED STATES OF AMERICA
THIS NOTE IS LEGAL TENDER FOR ALL DEBTS, PUBLIC AND PRIVATE
B
WASHINGTON, D.C.
1
ONE DOLLAR


THE UNITED STATES OF AMERICA
ONE
1
ANNUIT COEPTIS
NOVUS ORDO SECLORUM
ONE DOLLAR


FEDERAL RESERVE NOTE
THE UNITED STATES OF AMERICA
THIS NOTE IS LEGAL TENDER FOR ALL DEBTS, PUBLIC AND PRIVATE
A
WASHINGTON, D.C.
5
FIVE DOLLARS


THE UNITED STATES OF AMERICA
5
FIVE
FIVE DOLLARS


FEDERAL RESERVE NOTE
THE UNITED STATES OF AMERICA
THIS NOTE IS LEGAL TENDER FOR ALL DEBTS, PUBLIC AND PRIVATE
B
WASHINGTON, D.C.
10
TEN
TEN DOLLARS


THE UNITED STATES OF AMERICA
10
TEN
TEN DOLLARS

RESOURCE MATERIAL - Graph Paper

TABLE OF SYMBOLS

DEFINITIONS	SYMBOL	DEFINITIONS	SYMBOL
plus; add; positive	+	line	⟷
minus; subtract; negative	-	ray	⟶
plus or minus	+ or -	perpendicular lines	⊥
times; multiply	· or X	parallel lines	∥
divide	÷	degree	°
divide	$\overline{)\quad}$	equals	=
square root	$\sqrt{\quad}$	is not equal to	≠
cube root	$\sqrt[3]{\quad}$	is less than	<
angle	∢	is greater than	>
between two numerals or letters at the end of a series or sequence; and so on	...	encloses a set when numbers are included: empty set when empty	{ }
		subset	⊂
triangle	△	intersection	∩
rectangle	▭	union; join	∪
parallelogram	▱	percent	%
circle	⊙	foot, minute	'
		inch, second	"
line segment (as $\overline{AB}$)	—		

METRIC TABLE

PREFIX	VALUE	LENGTH	CAPACITY	WEIGHT (MASS)
KILO	1000	kilometer* (km)	kiloliter (kl)	kilogram* (kg)
HECTO	100	hectometer (hm)	hectoliter (hl)	hectogram (hg)
DEKA	10	dekameter (dam)	dekaliter (dal)	dekagram (dag)
	1	meter* (m)	liter* (l)	gram* (g)
DECI	$\frac{1}{10}$ or .10	decimeter (dm)	deciliter (dl)	decigram (dg)
CENTI	$\frac{1}{100}$ or .01	centimeter* (cm)	centiliter (cl)	centigram (cg)
MILLI	$\frac{1}{1000}$ or .001	millimeter* (mm)	milliliter (ml)	milligram* (mg)

* most frequently used

BASIC CLASSROOM EQUIPMENT CHECKLIST

MATERIALS:

Abacus - Class size/indiv....... ____
Attribute blocks................ ____
Balance Beam.................... ____
Calculators..................... ____
Calendar - class size........... ____
Clock - large - class size...... ____
Clock - individual size......... ____
Clock - stamp................... ____
Coin stamps..................... ____
Compass......................... ____
Cubic counting blocks........... ____
Cuisenaire rods................. ____
Dominoes........................ ____
Felt cut-outs................... ____
Flannel board................... ____
Flash cards..................... ____
Fractional parts (assorted)..... ____
Geo boards...................... ____
Geometric patterns.............. ____
Hundred charts - class size/ind. ____
Interlocking cubes.............. ____
Laminating paper................ ____
Magnetic board.................. ____
Magnetic discs.................. ____
Measuring tools-English, Metric (rulers, scales, compasses, protractors, beakers, cups, spoons, thermometers).......... ____
Number lines - class/indiv...... ____
Numerals - tactile.............. ____
Plastic discs................... ____
Play money...................... ____
Powers of Ten................... ____
Protractor...................... ____
SEE calculators................. ____
Scale........................... ____
Screen (pull-down type)......... ____
Spinners........................ ____
Squared place value material.... ____
Standard playing cards.......... ____
Tangrams........................ ____
Tens frame...................... ____
Timers (1,2,3 minute)........... ____
Tokens (various sizes/colors)... ____
Trundle wheel................... ____

SUPPLIES:

Adding machine tapes (for classroom/ind. number lines)...... ____
Chalk........................... ____
Construction paper.............. ____
Elastic bands................... ____

BASIC CLASSROOM EQUIPMENT CHECKLIST

SUPPLIES: cont'd

Envelopes (all sizes).......... ____
Erasers, board/individual...... ____
Felt pens (all sizes).......... ____
Ditto, Rexograph paper......... ____
Glue........................... ____
Gram weights................... ____
Graph paper (1 cm, ½, 1")...... ____
Grease pencils................. ____
Oak tag........................ ____
Paper clips.................... ____
Paste.......................... ____
Plastic discs.................. ____
Pointer........................ ____
Primary pencils................ ____
Rubber bands................... ____
Scissors - primary, left hand.. ____
Scotch tape.................... ____
Spinner........................ ____
String......................... ____
Tape........................... ____

COLLECTIBLES:

Beads and beans................ ____
Bottle caps.................... ____
Buttons........................ ____
Cardboard (all sizes).......... ____
Cereal boxes................... ____
Coffee cans.................... ____
Detergent boxes, shoe boxes, meat trays, and plastic containers.................. ____
Egg cartons.................... ____
Felt for desk mats............. ____
Ice cream sticks............... ____
Juice containers............... ____
Macaroni....................... ____
Magazines...................... ____
Menus.......................... ____
Metrically measured cartons.... ____
Milk containers................ ____
Newspapers..................... ____
Paper plates................... ____
Sand........................... ____
Spools......................... ____
String, yarn................... ____
Styrofoam...................... ____
Tongue depressors.............. ____
Wire hangers................... ____
Ziploc Bags.................... ____